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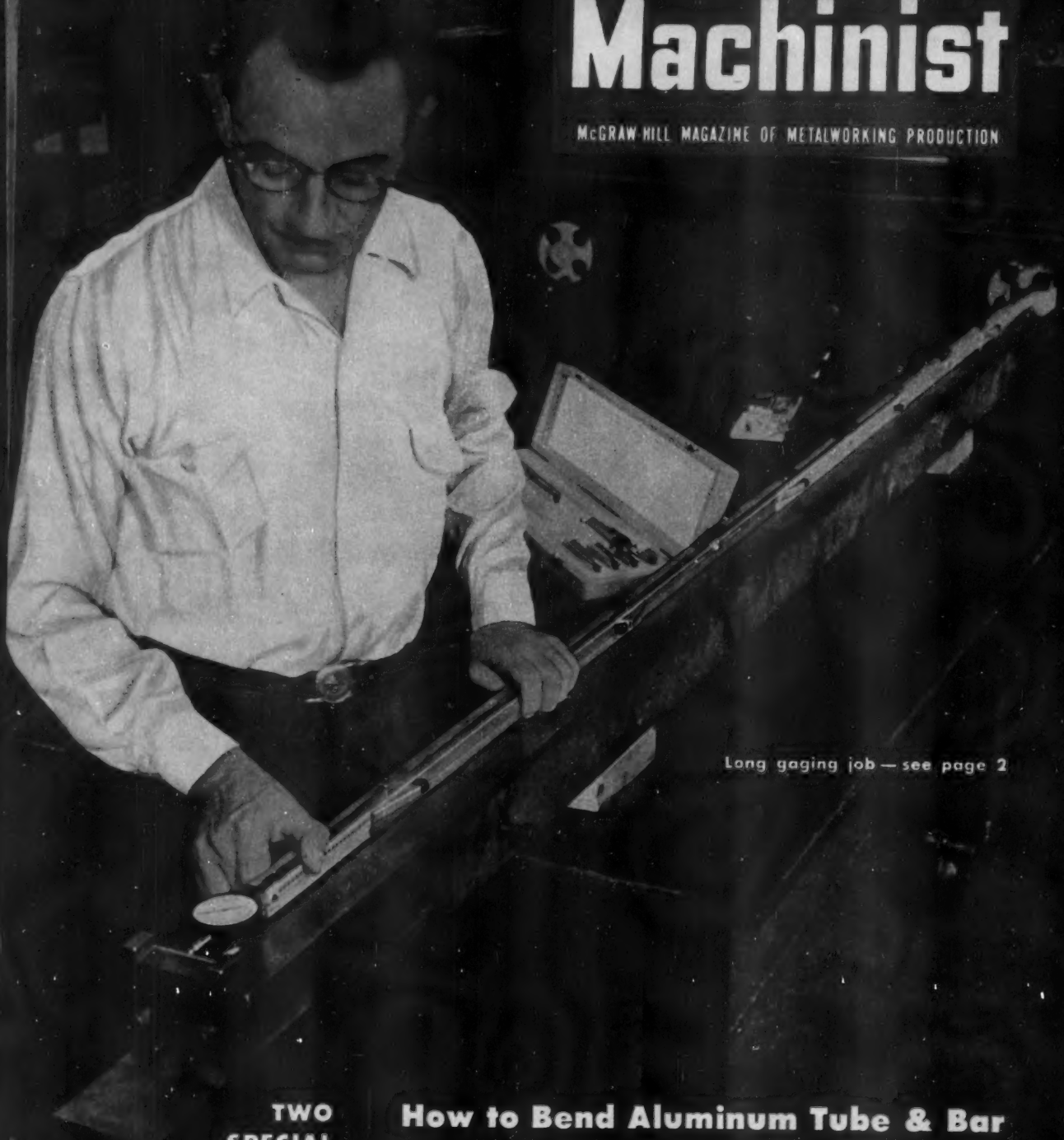
American Machinist

MAY 24, 1954

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION



Long gaging job — see page 2

TWO SPECIAL REPORTS

How to Bend Aluminum Tube & Bar

Canada — A Metalworking Appraisal

for want of a horse the smith was lost

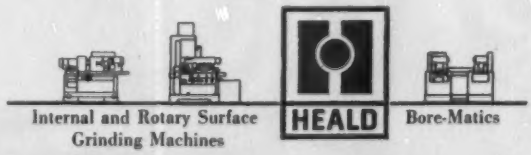
THE blacksmith shop was a busy place . . . when horsepower came "on the hoof". But when the first gasoline engine coughed and sputtered into life, the days of the village blacksmith were numbered.

That's progress. Spurred on by competition, it spells success for some things, obsolescence for others.

In today's highly competitive market the search for *new* and *better* methods of production is an urgent one. It's a problem that calls for fresh thinking and sound experience.

When it comes to precision finishing, we would like to show you how Heald engineering and the latest Heald equipment can help you build a better product at lower cost. New developments in automation, way-type and transfer Bore-Matics, interchangeable tooling and internal grinding methods may well be the answer to your particular problems.

Competition is wonderful when you're *ahead* of it. Our business is to keep you there. That's why IT PAYS TO COME TO HEALD.



Internal and Rotary Surface Grinding Machines

Bore-Matics

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MAGAZINE OF METALWORKING PRODUCTON

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ABC ABP

chips

CLOSE CHECK . . . Two formed 36-in.-dia sheet-metal disks, pierced to take a cast-iron hub, rivets and assembly bolts, make up a metal wheel. One disk has a retaining lip formed on it against which the tire is held by a clamp ring with a similar lip. The tire is rubber, backed by a sheet-metal strip, sheared to length and butt flame-welded. The die setup to produce this strip to length was a cut-and-try proposition that required subsequent exact measurement so it could be duplicated. A DoAll micro-step gage did the job as shown on the cover. As made up of base holder, nine 10-in. gage blocks, two 5-in. blocks, a 2-in., an 0.150-in. and an 0.070-in., plus an end-mounted dial indicator, ball end, and other parts, the gage showed the die to measure 111.7027 in.

DIAMOND SAVING . . . Wayne L Fanger, general foreman of tool grinding at International Harvester, Fort Wayne, Ind, tells in our lead article how they plunge-grind chipbreakers in carbide tools. Breakers are limited to the exact size needed, thus reducing wheel waste.

BENDING AL . . . J M Adle of Kaiser Aluminum has been putting together a chapter on bending methods for aluminum tube and bar, to be included in a forthcoming handbook. From it we have abstracted an 8-page Special Report, giving methods, tooling and lubrication.

DRILLING . . . Two articles are devoted to drilling of quite different kinds. C A Wiken of Rockwell gives six case studies of application of Delta air-hydraulic drilling units in building up machine tools. . . . And, in a compact page, we picture a setup for drilling hundreds of holes in boiler drums. Exact spacing is the problem.

HARD FACE . . . Cleveland Hard Facing Co specializes, as its name implies. John Wischhusen, vice-president, tells how the company produces precision hard-faced surfaces—the welding, machining, and mechanization of operations. Most of it is gas welding.

FOR BETTER PLANTS . . . We've provided two articles to help you improve your plant. The first, by W K Ousley, vice-president of Boston Mfrs Mutual Fire Insurance Co, gives five simple rules to prevent disaster from fire. This is a basic plan to avert catastrophe. . . . Carl A Schroeder of Wakefield Brass Co, Vermilion, Ohio, explains how acoustical panels, new lighting and other features were worked in with a plant expansion. It makes the whole plant a testing laboratory.

SHOP SHOTS . . . Two pages of pictures show a jacked-up lathe that swings 20 in., machines dated for maintenance, a grinder with an air spindle for cutters, tapping in thin magnesium, heavy milling, and a forging press. Sources include Chrysler, Chance Vought, Vlier, DeLaval, and Nebel.

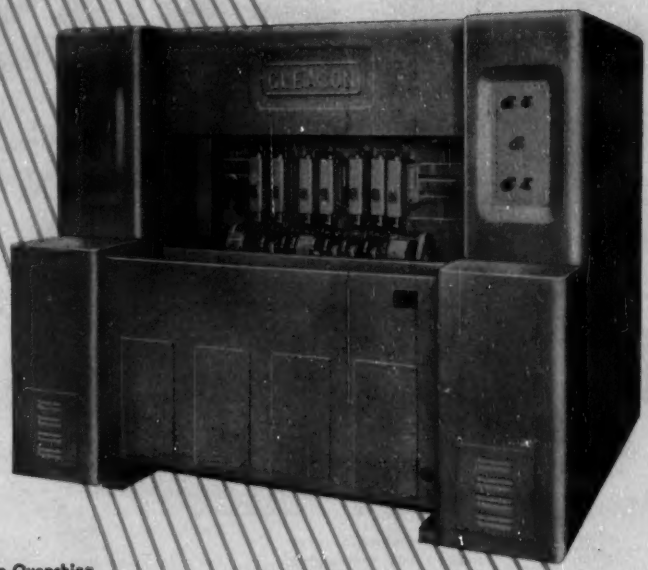
COMING . . . June 7 *AM* will include a Special Report on thermal number and what it means in metalcutting, articles on materials handling in an old, multi-story plant, making of clutch parts with some tricky air tools, big-plant tooling in a small plant, plating with nickel on aluminum, how to select grinding wheels, and high-speed photography as an aid in finding production troubles.

ASSISTANT . . . Kenneth L Kline was born in Lawrence, NY, finished his lower schooling around New York City. Then came six semesters of marine engineering at the US Coast Guard Academy, a year of chemical engineering and 2½ years of English at the University of Michigan, from which he was graduated in 1949. Various summer and part-time jobs, plus 1½ years in glass-fiber and paper making, and the same period as an investment adviser in a Bridgeport bank, brought him to Avco at Bridgeport. He began in tool engineering, a year later was lubrication engineer. Then his college English came to the fore and he joined AM. He is single, handles "Practical Ideas" and management articles for us.

ELIMINATE HEAT TREAT DISTORTION PROBLEMS

GLEASON

QUENCHING MACHINES for ROUND FLAT and SHAFTED PARTS



No. 26 QUENCHING PRESS

No. 16 and No. 36 Quenching Presses also available

No. 140 ROLLING QUENCH MACHINE

The Gleason No. 26 Quenching Press and No. 140 Rolling Quench Machine offer the solution to distortion problems of round, flat and shafted parts. Round and flat parts up to 36" in diameter, or shafted parts up to 4" in diameter and 40" long can be quenched. Both machines are ideal for job lots or high production.

Write for leaflets and see how Gleason Quenching Machines will fit your requirements.

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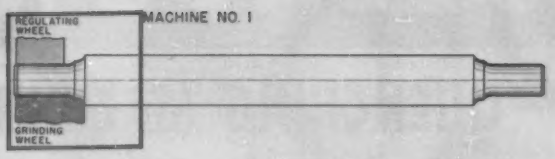
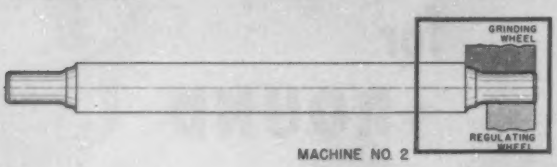
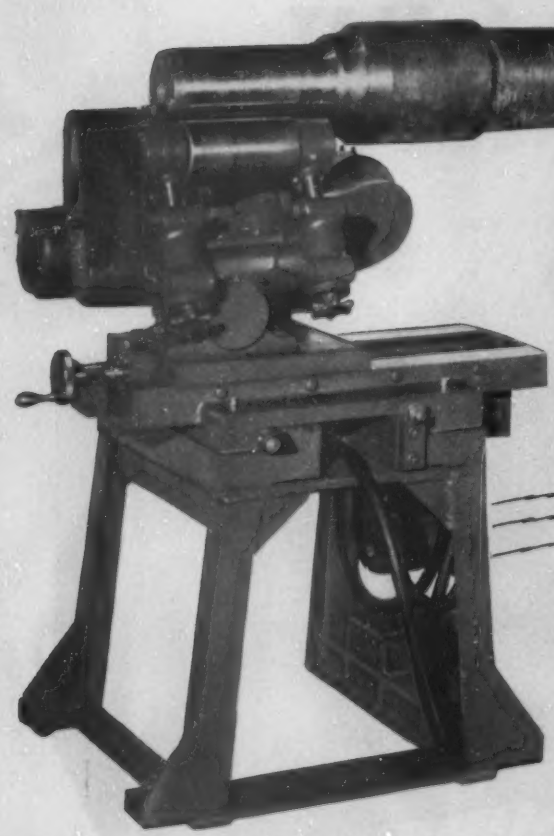
How to centerless weighing



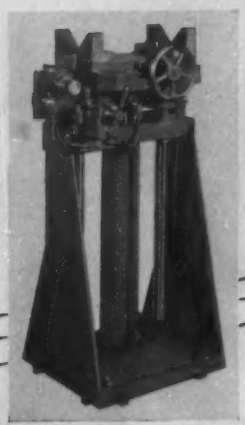
MACHINE NO. 1



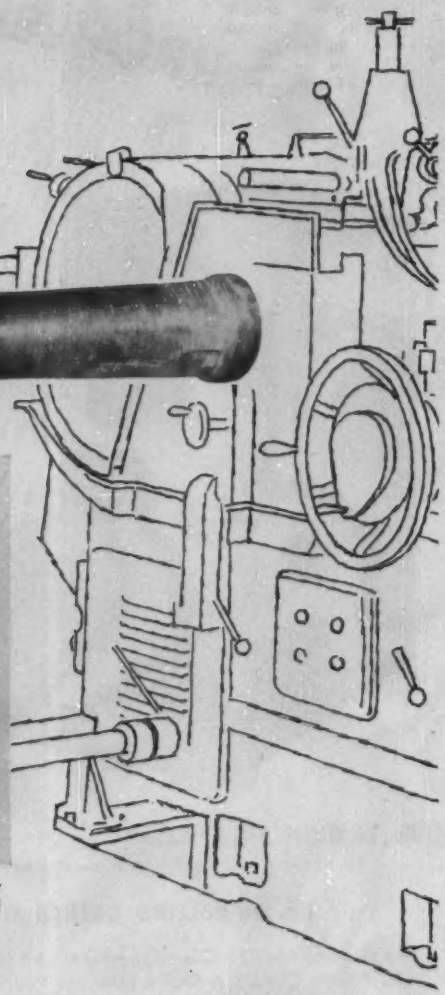
MACHINE NO. 2



Powered outboard roller support helps rotate part during grinding.



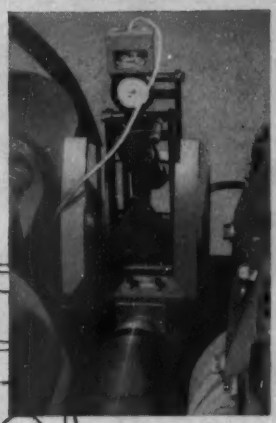
Hydraulically operated Power Lift facilitates loading and unloading heavy parts.



Anti-friction bearing diameters and adjacent radii are centerless ground on two CINCINNATI FILMATIC No. 3's equipped by Cincinnati Special Machine Tool Division.

CINCIN

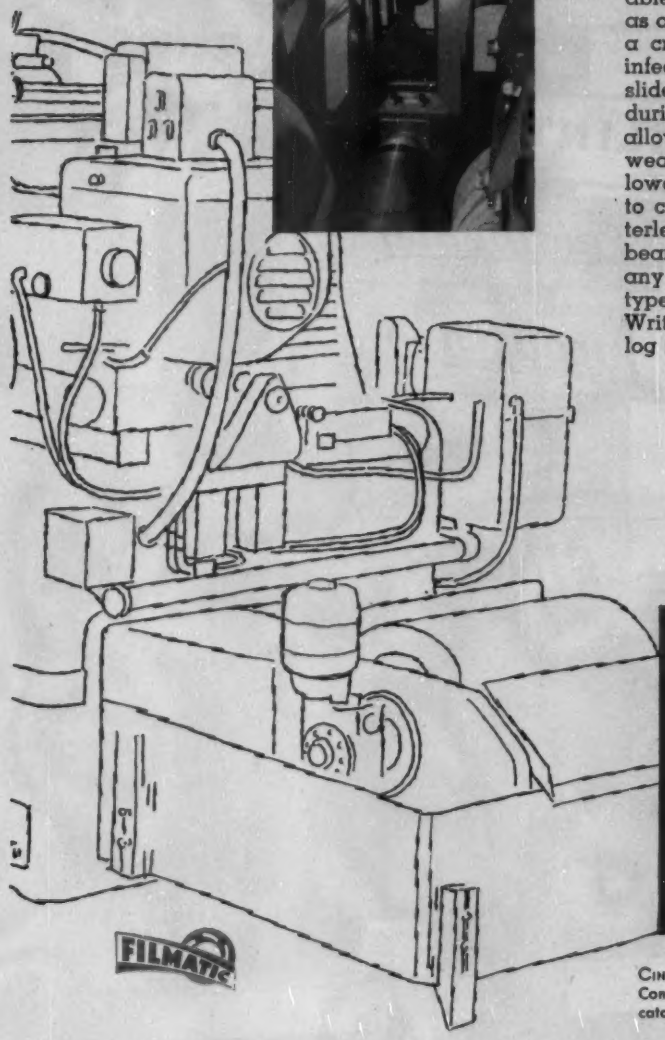
grind parts half a ton

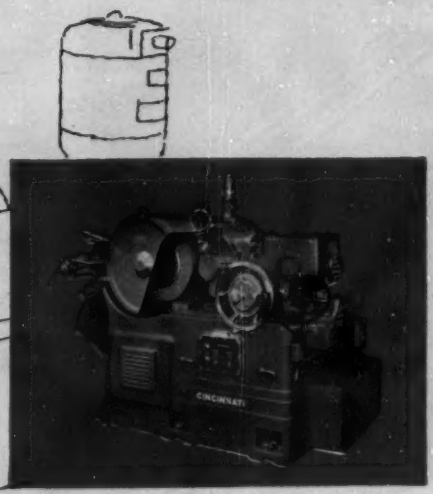


Caliper gage contacts, measures and swings free of the work automatically in coordination with infeed movement.

It's a big job to produce 90 half-ton car wheel axles per 8-hour shift. One railway equipment manufacturer does it by employing many of the latest automation techniques. Two CINCINNATI FILMATIC No. 3 Centerless Grinders are included in the automated production line. The first machine grinds the anti-friction bearing diameter, dust collar diameter, and adjacent radii in one operation, at one end of the axle. The axle rolls over an elevated "highway" to the second machine, where the corresponding bearing diameters and adjacent radii are ground. ¶ Several interesting innovations are incorporated in this CINCINNATI Centerless equipment. A variable speed power driven outboard roller support serves as a helper drive to rotate the axle. Lateral movement of a cross slide on this support is synchronized with the infeed movement of the machine's regulating wheel slide. A continuous caliper type gage insures size control during grinding, to an accuracy of less than half the allowable tolerance. A hydraulic elevating device saves wear and tear on the equipment and operator by gently lowering the work to grinding position and elevating it to crane height after grinding. ¶ CINCINNATI No. 3 Centerless Grinding Machines, with their exclusive FILMATIC bearing spindle mounting, are head and shoulders above any other precision grinder for handling work of this type. Catalog No. G-570-3 gives you a few reasons why. Write for a copy, or look in Sweet's Machine Tool Catalog for brief specifications.

CINCINNATI GRINDERS INCORPORATED
Subsidiary of The Cincinnati Milling Machine Co.
CINCINNATI 9, OHIO





CINCINNATI FILMATIC No. 3 Centerless Grinding Machine. Complete specifications may be obtained by writing for catalog No. G-570-3.

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OF SPRING...

The winter's production of small gasoline engines with all their Fellows-cut cams and gears... starting up with the lush green grass

Photo Courtesy Pioneer-Gen-E-Motor

Typical Fellows gear cutting performance is shown here on a power-mower crank shaft.

The marvel is not only their number in total thousands, but the quality that's built into them for the price the engine maker gets.

All the manufacturers of small engines whose names are represented here pin their faith to the Gear Shaper method of producing top quality gears under tight cost control.

If you count on the tooth accuracy of the gear parts to help sustain the reputation of your product, you, too, might well assure it with a Fellows-equipped gear department.

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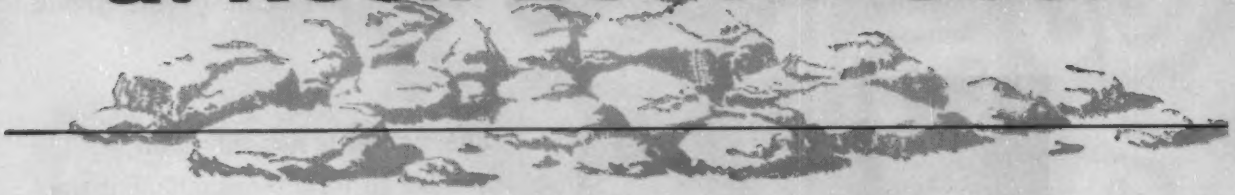
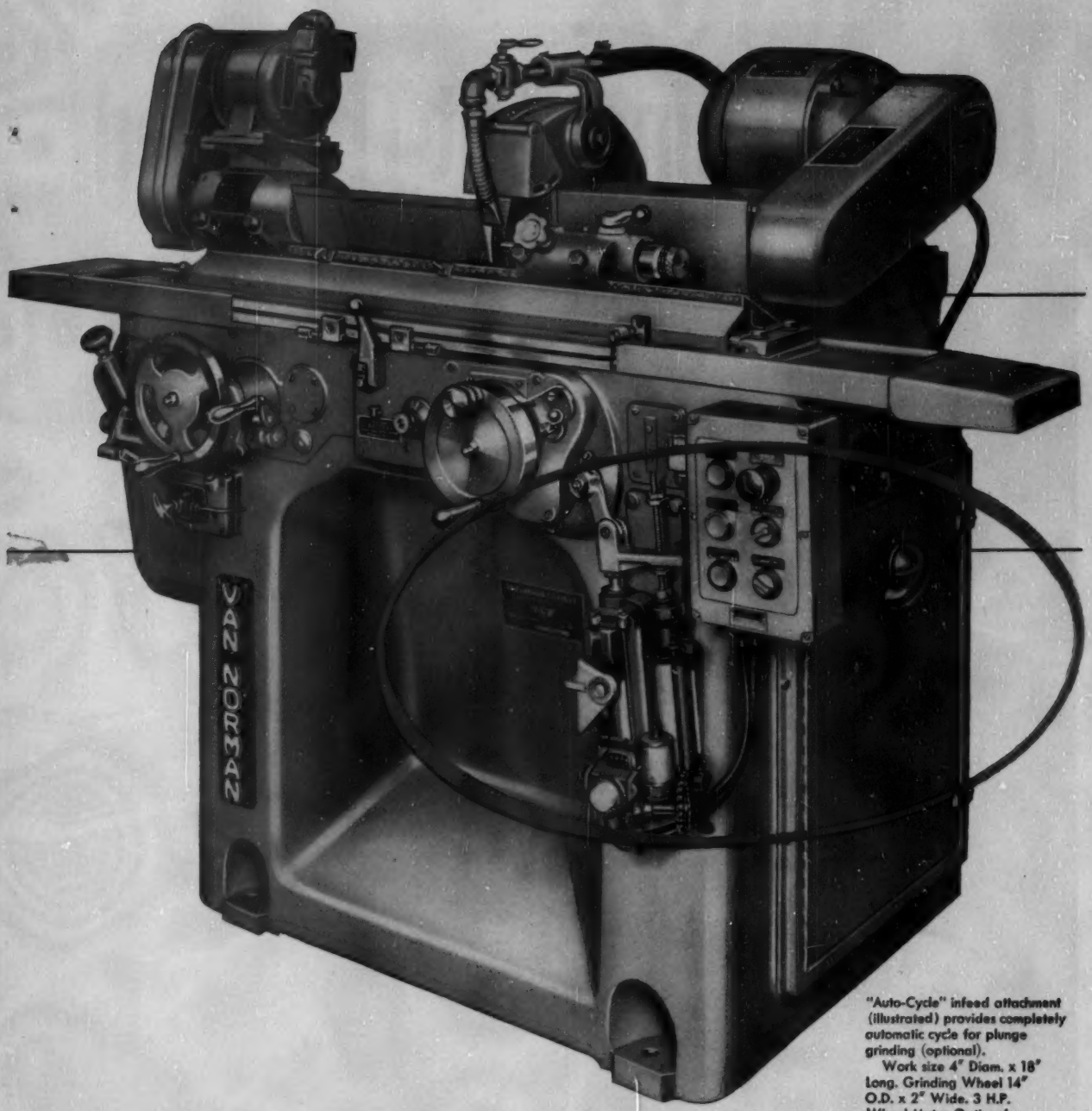


at Rock-Bottom Cost

...in Precision Plunge or Traverse Grinding of Small Parts—

VAN NORMAN — Manufacturers of Ram and Column Type Milling Machines, Cylindrical Grinders, Spline Grinders, Oscillating Radius Grinders, Special Production Grinders, Centerless Grinders



"Auto-Cycle" infeed attachment (illustrated) provides completely automatic cycle for plunge grinding (optional).
Work size 4" Diam. x 18" Long. Grinding Wheel 14" O.D. x 2" Wide. 3 H.P. Wheel Motor Optional.

This ultra-modern 418 cylindrical grinder cuts costs of small part grinding. It is especially adaptable for use in tool rooms, job shops, or plants where work is in small, medium or production runs. Jobs are quickly set-up... work pieces are easily loaded, ground and unloaded. Every feature in the 418 cylindrical grinder *spells accuracy, speed* and *economy.* Get the full facts today. Write for information.

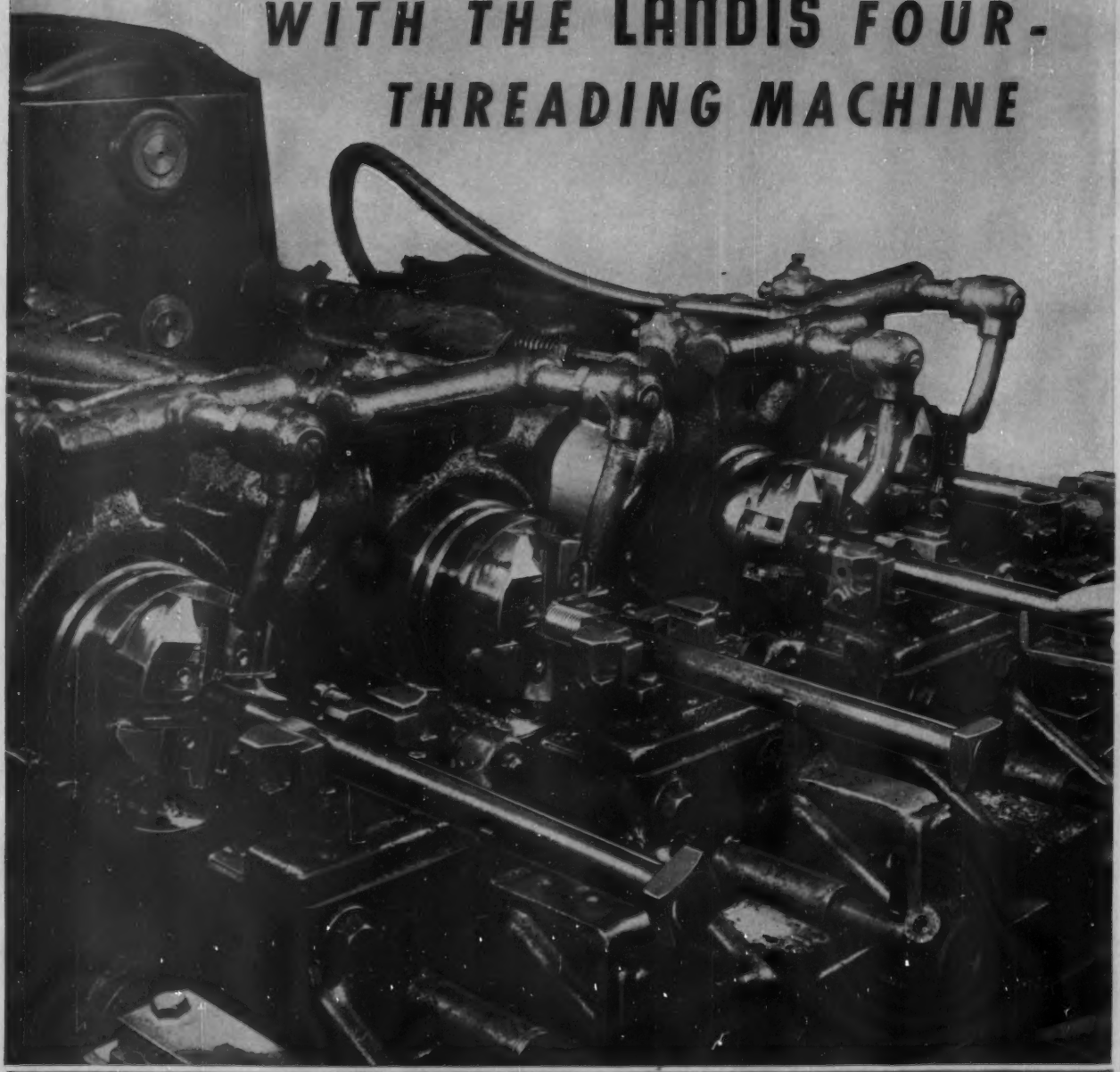
Cylindrical Grinder

VAN NORMAN COMPANY

SPRINGFIELD 7, MASSACHUSETTS

One Machine Bolt Threaded

WITH THE LANDIS FOUR-THREADING MACHINE



LANDIS *Machine* COMPANY

THE WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF THREAD GENERATING EQUIPMENT

Every 4⅓ Seconds ! ! ! !

SPINDLE SEMI-AUTOMATIC

A single operator at the Pittsburgh Screw and Bolt Corporation produces an average output of 840 machine bolts per hour.

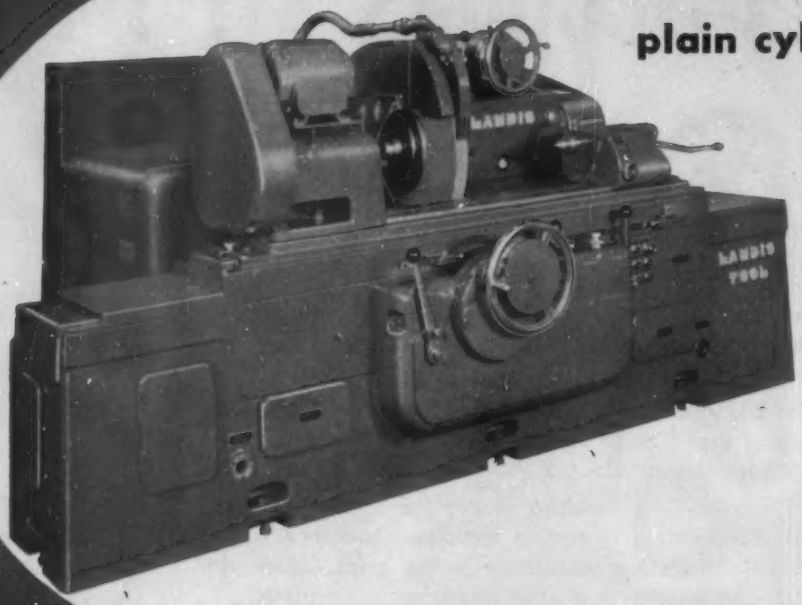
This operation requires the threading of 1″ Square Head Machine Bolts from Commercial Steel blanks of 217/163 Brinnel hardness. 1″ 8 pitch USS threads are cut 2¾″ long at a cutting speed of 44 surface feet per minute. Production is continuous and chaser cost is extremely low.

The use of the *LANDIS* Four-Spindle Machine allows the operator to surpass the output of four independent threading spindles. Operation is semi-automatic—the operator inserts the workpiece in the grips, which open and close automatically, and removes it when threading is complete. The die head automatically feeds onto the workpiece, opens automatically and is automatically withdrawn at the point when the desired thread length is completed.

Send specifications when writing for Bulletin #E-88-1

WAYNESBORO PENNSYLVANIA

Landis For Any



plain cylindrical grinders

A complete line for economical long or short runs. Swings available from 4" to 24", with lengths between centers from 18" to 240". Special tooling and hydraulic feeds for semi-automatic cycles also available.

centerless grinders

Two sizes made for thru feed or infeed grinding of straight or profiled work. Up to 6" diameter work and 10" wide wheels. A variety of tooling, loaders and feeds available for hand or automatic operation.

LANDIS TOOL COMPANY WAYNESBORO, PENNA., U. S. A.

Cylindrical Grinding Job

universal cylindrical grinders

For tool room, job shop or moderate production on a wide variety of cylindrical parts. Does straight, taper, internal and face grinding operations. Available in 10" to 48" swings with lengths from 24" to 120".

single purpose grinders

Maximum production of parts like pistons, rolls, crank shafts, cam contours, valves, bearing races and jet engine components. Parts can be chucked or put between centers. Work handling can be built-in.

LANDIS

precision grinders

You get 45 distinct standard equipment

Here's a highly skilled G&L craftsman making final adjustments in the spindle feed gears. All gears have been flame-hardened and precision ground to insure lasting precision... smooth, vibrationless positive power.

spindle speeds as with a G&L 30 Series

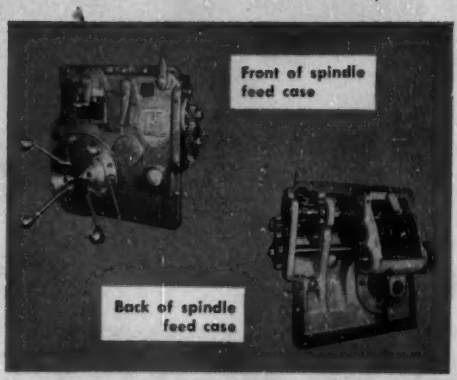
Only a G & L 30 Series table type Horizontal offers so many separate spindle speeds and positive all-geared spindle drive — plus the high torque and full power you need for efficient machining at low or high speeds.

THE engineering of a G&L 30 Series Horizontal Boring, Drilling and Milling Machine's headstock and spindle drive provides a perfectly balanced combination of versatility, efficiency and long-lived precision. With positive all-geared drive — 45 speeds in fine increments — are easy to select or change. Design of the gear train insures high torque at the cutter when working at lower speeds. And — at high speeds — the drive gear shifts and performs with a flywheel effect that provides maximum cutting efficiency of carbide tools. What's more, four gibs on the headstock assure maximum bearing surface, perfect alignment at all times.

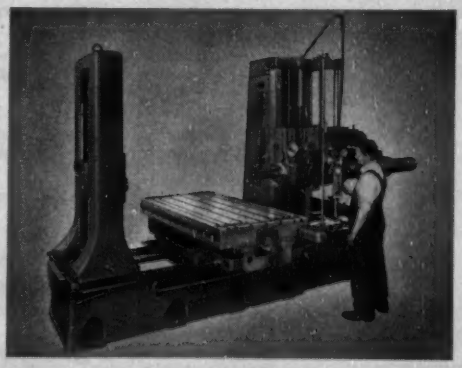
Check these other important advantages

Two of the many other additional advantages you get with a G&L 30 Series are (1) flame hardened and precision-ground bed and saddle ways which are standard equipment and, (2) the option of extended saddle, saddle supports and auxiliary runways which take the risk out of precision machining large workpieces that require the full range of the machine.

Comparing a G&L 30 Series with any other machine in its class — you'll discover that feature for feature, advantage for advantage, you can't buy better. Like all G&L machine tools, the 30 Series has been "often copied, never equaled."



Adjustable micrometer dial graduated in .001" provides fast, accurate spindle positioning. At right, dials beneath cover plate are geared to rotary selectors, show speed or feed engaged. While making selections, operator merely watches window until desired setting appears.

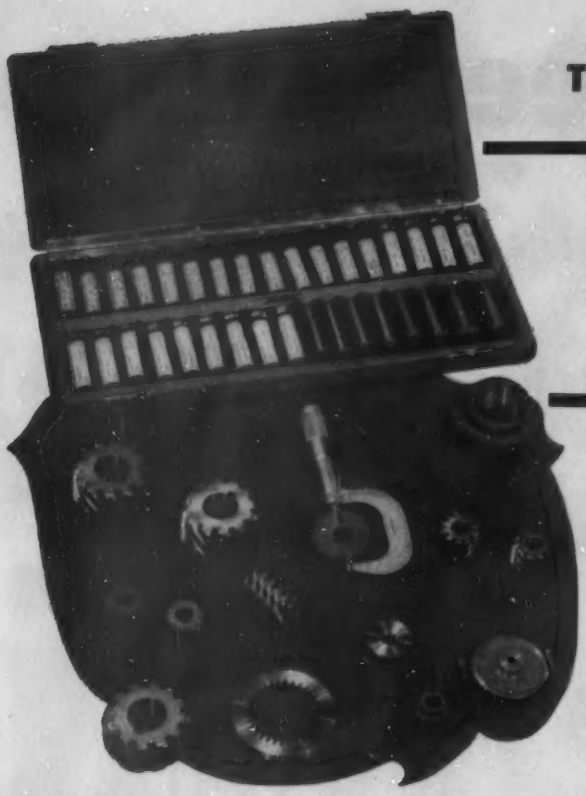


There are two basic models in the 30 Series — the 340-T with 4" spindle and 20 hp, or the 350-T with 5" spindle and 25 hp. Both machines offer a choice of three basic arrangements of table and saddle.

GIDDINGS & LEWIS MACHINE TOOL CO.

FOND DU LAC, WISCONSIN

Builders of the world's finest heavy-duty machine tools — Horizontal Boring, Drilling and Milling Machines — table, floor and planer types; Hypro Double Housing and Openside Planers; Planer Type Milling Machines and Vertical Boring Mills; and Davis Cutting Tools



THE Van Keuren GEAR MEASURING SYSTEM

Set 26EX—Gear Measuring Wires, accurate to ± .000025", for common diametral pitch external spur gears.

VAN KEUREN GEAR MEASURING WIRES PROVIDE THE MOST ACCURATE AND LOW COST METHOD OF MEASURING THE TOOTH THICKNESS OF SPUR AND HELICAL GEARS, INVOLUTE SPLINES AND INVOLUTE SERRATIONS.

ONLY... EQUIPMENT NEEDED:

1—SET VK MEASURING WIRES
1—MEASURING INSTRUMENT

Complete information regarding the use of Gear Measuring Wires is contained in a 50-page section of the Van Keuren CATALOG and HANDBOOK No. 35. Included in this section are:

- . . . table of wire sizes for the 1.92", 1.728", 1.68" and 1.44" series.
- . . . tables of wire measurement including change factors for standard external and internal spur gears of 14½°, 17½°, 20°, 25°, and 30° pressure angles and of from 5 to 500 teeth.
- . . . table of relationships between depth of cut and tooth thickness for common pressure angle gears.
- . . . definitions and exact formulas covering involute spur gears.
- . . . tables of involute tooth parts for standard addendum and stub tooth involute gears.
- . . . information, formulas and examples regarding the wire measurement of helical gears.
- . . . information and examples concerning the wire measurement of enlarged pinions and reduced gears.
- . . . tables of wire measurement for involute splines.
- . . . tables of wire measurement for involute serrations.
- . . . tables of comparative measurement over three sizes of wires for use in involute profile checking.

CATALOG and HANDBOOK No. 35 is available without charge by writing to: The Van Keuren Co., 173 Waltham St., Watertown, Mass. Ask for your copy.

VK
35th YEAR

THE Van Keuren CO.,

173 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires • Chrome Carbide Taper Insert Plug Gages

PRATT & WHITNEY
2B DIE SINKER

equipped with
GOODRICH HYDRAULIC DUPLICATOR
produces
ALL CHERRYING CUTS
with inexpensive shank-type cutters and
WITHOUT EXTRA ATTACHMENTS

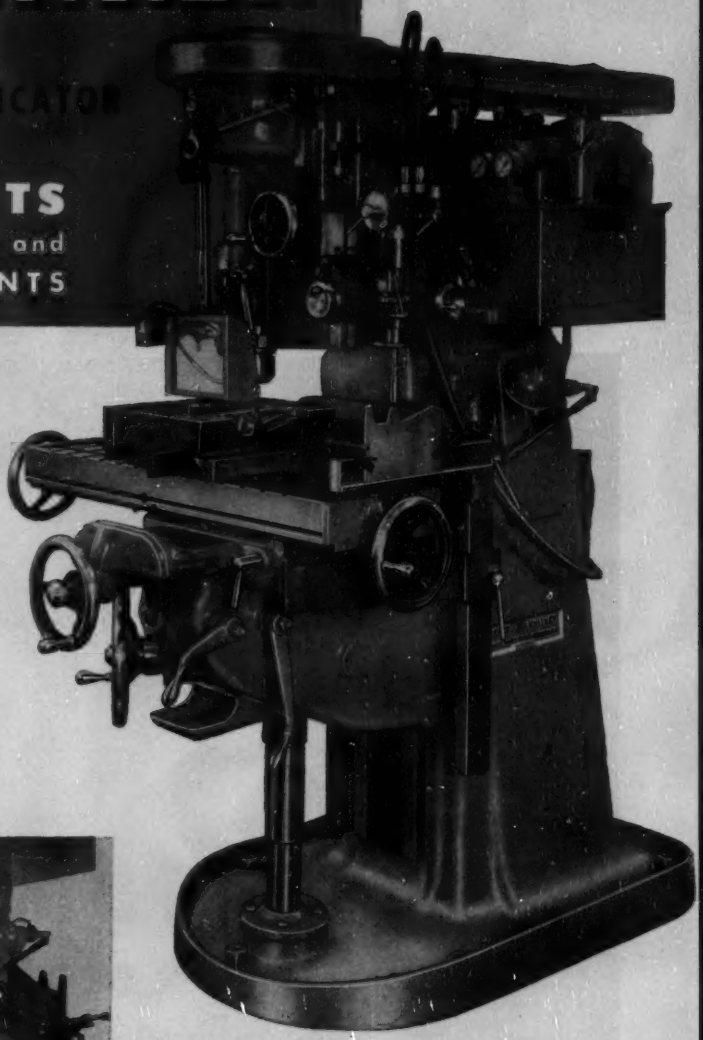
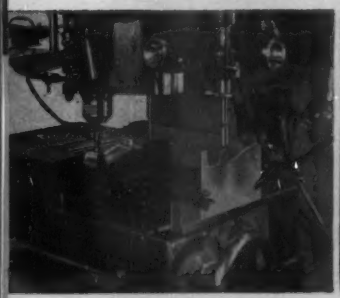
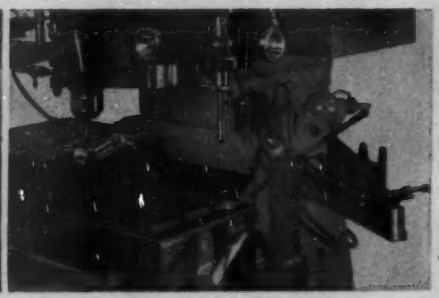


TABLE WORKING SURFACE: 12" x 36"

Fast, accurate and reliable, the Pratt & Whitney 2B Plain Die Sinker equipped with the Goodrich Hydraulic Duplicator simplifies and speeds up all die sinking jobs. Working from a full, 3-dimensional model or an inexpensive, easy-to-make template, the 2B Machine faithfully duplicates all curves and angles of the master form. Many more types of cuts can be made, using inexpensive shank cutters, than are possible with the conventional cherrying attachment; there is an infinite range of radius cuts . . . concave or convex. Much layout work is eliminated. Operation is convenient with cutting action under complete control at all times. Fatigue is greatly reduced, productivity increased.

The P&W 2B Die Sinker is also available without the Goodrich Duplicator but with the necessary mounting pads should you wish to add this feature later. If die sinking is an important part of your operations, the 2B is a "must" for your modernization and replacement program.





Shape of the template is accurately duplicated in the die block. As shown at the right, template can easily be swung out of the way.

SEND FOR COMPLETE INFORMATION . . .

. . . see how the 2B Machine

PRATT & WHITNEY
DIVISION NILES-BEMENT-POND COMPANY
WEST HARTFORD 1, CONNECTICUT, U.S.A.

MODERNIZE with PRATT & WHITNEY REPLACE FOR PROFIT

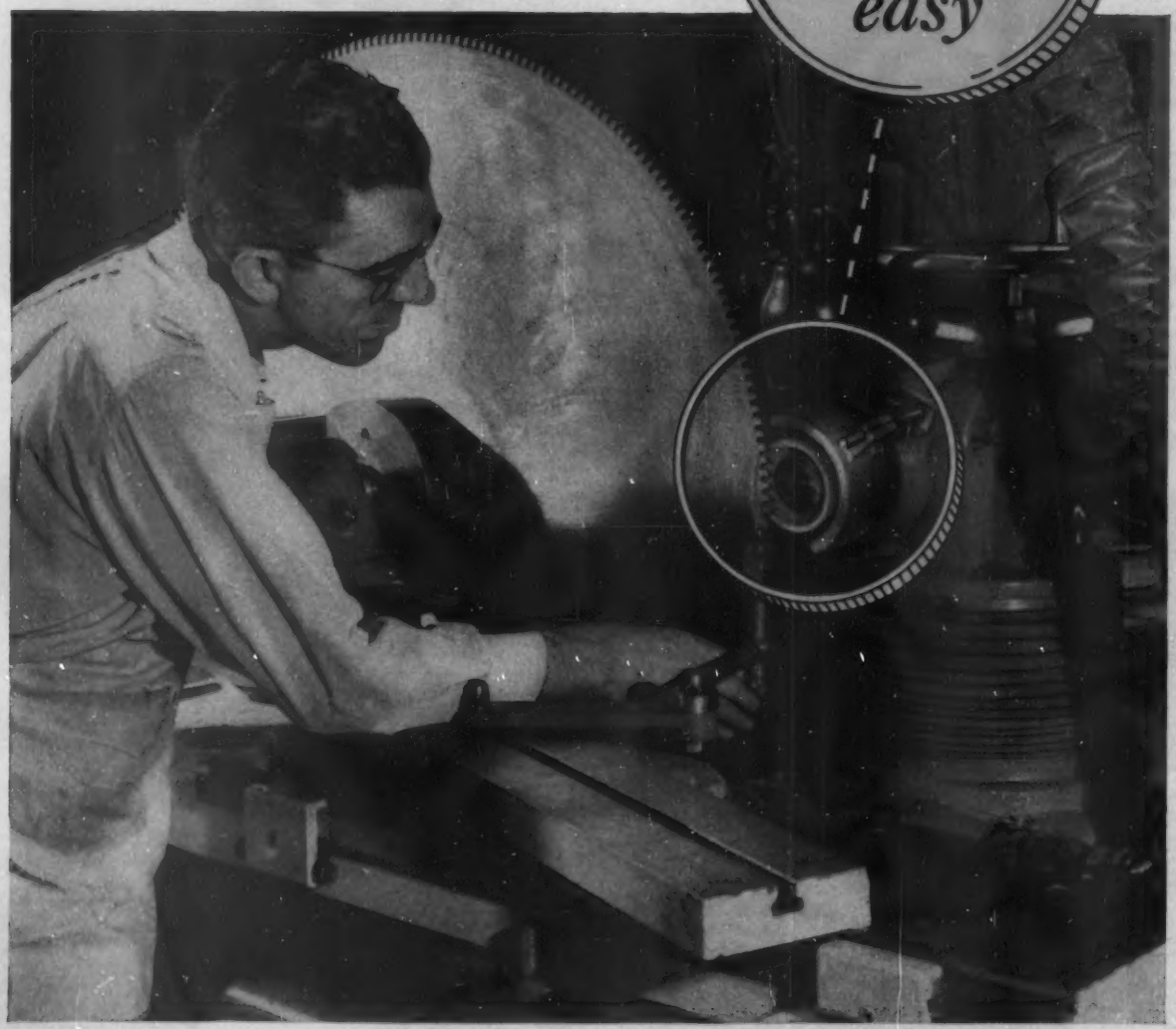
First Choice for Accuracy

MACHINE TOOLS • CUTTING TOOLS • GAGES

Fastest, most versatile cutter and tool grinder ever built . . .

The Norton No. 20 with the tilting wheel head...

makes hard jobs easy



Fast Set-Up For A Big Job. Ordinarily difficult to sharpen because of interference problems, this 39" diameter special cutter is easily handled on a Norton No. 20 Cutter and Tool Grinder in the Carrier Corporation's Syracuse, N. Y., plant. The cutter is suspended vertically behind the table and base, while the No. 20's tilting wheel head is tilted down for backing off the cutter's 364 carbide teeth to the proper relief angle. Wheel guard is removed to show Norton cup diamond wheel.

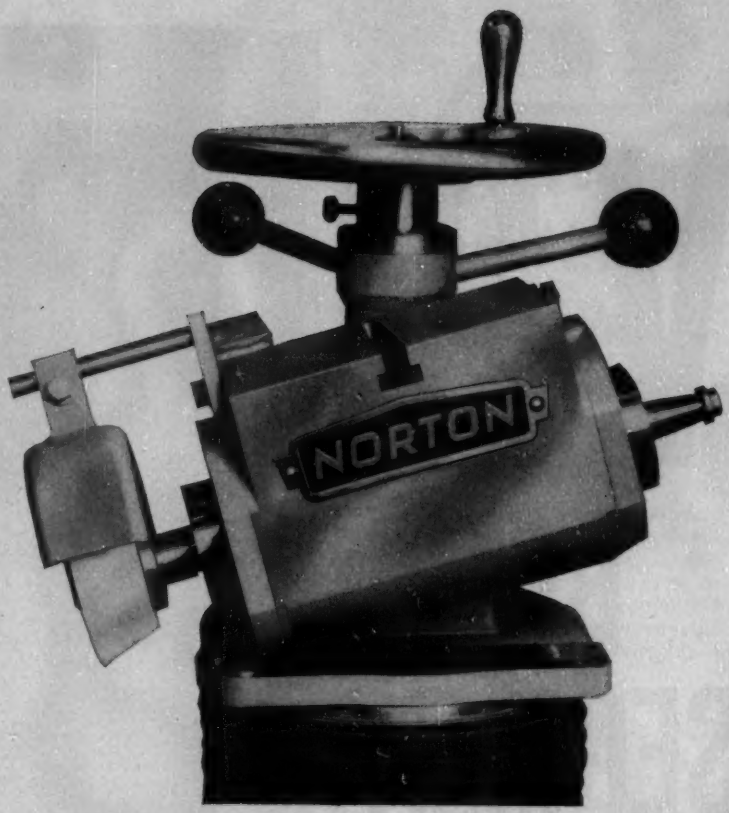
If wrestling with tricky set-ups is slowing down your cutter and tool grinding operations, take a good look at the Norton No. 20 Cutter and Tool Grinder. It's especially designed for quick, easy set-ups of hard-to-handle workpieces.

You can tilt the wheel head up to 15° above or below horizontal and swivel it a full 360°. This means no more time-wasting "trial and error" tactics — and new speed and economy when grinding taper reamers, step counterbores, form tools, milling cutters and other ordinarily troublesome jobs.

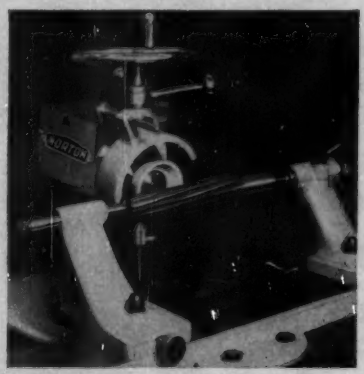
Other advanced features that add up to money-saving performance include: long table traverse and wheel slide travel . . . integral motor spindle . . . centrally located column elevating hand wheel . . . wheel slide graduated dials readable from any position and automatically lubricated table ways.

It will pay you

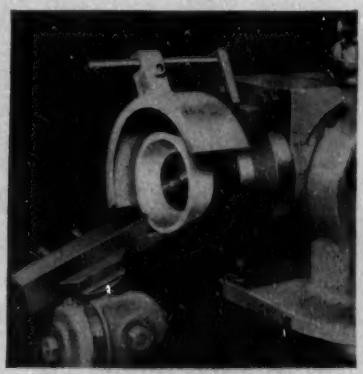
to get further facts on how the No. 20 can reduce your grinding time and costs. See your Norton Representative. Or write us direct for Catalog 189-4. And remember: only Norton offers you such long experience in both grinding wheels and machines to help you produce more at lower cost. NORTON COMPANY, Machine Division, Worcester 6, Mass. *In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 5.



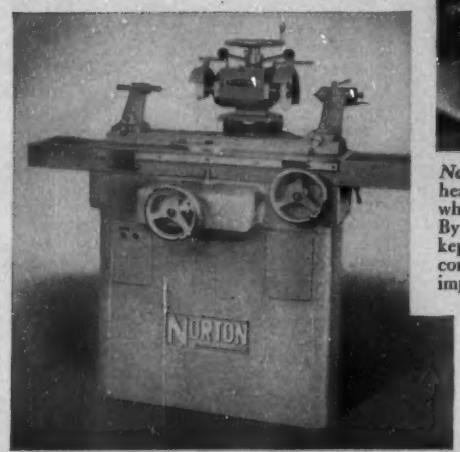
It Tilts! Chief source of the No. 20's remarkable versatility and speed is this wheel head that simplifies set-ups. It tilts up to 15° above or below horizontal and swivels through 360°. Accurate graduations provide for all adjustments and positive clamping devices assure stability during operation.



No Problem — Now. The tilting wheel head on the No. 20 is set at an 8° angle while grinding this spiral taper reamer. By this method, the clearance angle is kept constant for the full length. No more compromising or experimenting on this important job.



Grinding Form Tools Is Simplified with the No. 20's tilting wheel head. Here it is set at a 2° angle, while the tool is ground in a single set-up and wheel truing is minimized. Note the sharp corner which has been maintained on the tool.



Compact and Streamlined, the Norton No. 20 matches cost-cutting performance with space-saving design. Duplicate controls permit operation from front or either side.

To Economize, Modernize With NEW

NORTON

GRINDERS and LAPPERS

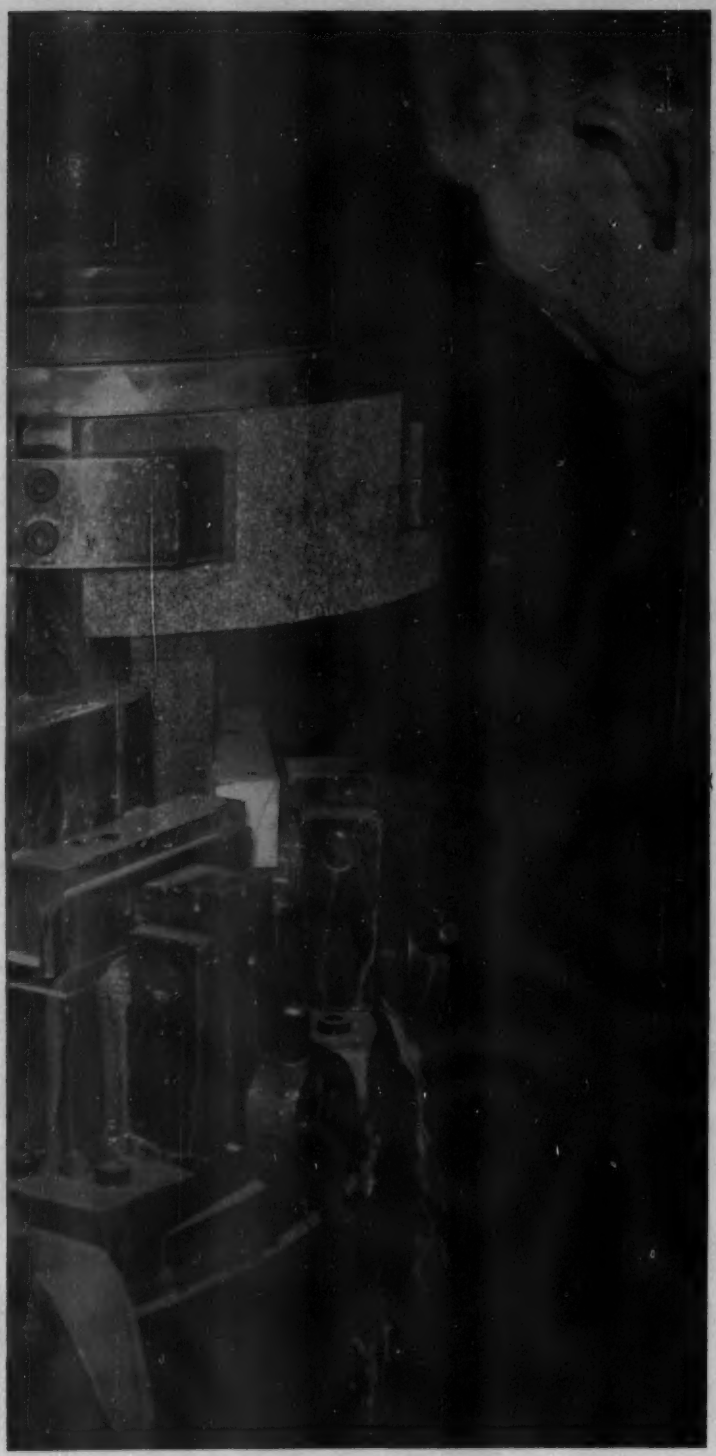
Making better products . . . to make other products better

District Sales Offices: Worcester • Hartford • New York • Cleveland • Chicago • Detroit

V20 BOND SEGMENTS

...help you produce closely controlled surface finishes at remarkably low cost—on nearly all types of metals, including non-ferrous

...continually putting more sense in your abrasive dollar



This customer saves $25 per wheel!

By changing from a premium-priced ring wheel to a Type CD18 Segmental Wheel with CARBORUNDUM's DA30-15-V20 segments, this user now removes 3/16" stock from two edges of 10 cast iron clappers in 30 minutes, holds tolerance to .005"... and *saves $25 on every wheel change.*

Only CARBORUNDUM's V20 Bond Segments offer all these advantages:

- **UNIFORM CUTTING AT HIGH RATES...** throughout the entire life of the segments.
- **COOL, FREE CUTTING** qualities that produce clean, undisturbed surfaces.
- **LESS DRESSING TIME...** because of the self-dressing, size-holding characteristics of V20 Bond.
- **EXTRA CUTTING LIFE...** through using harder grades without losing cutting effectiveness.
- **FEWER SET-UPS.** One grading grinds a large variety of materials successfully.

ASK YOUR CARBORUNDUM DISTRIBUTOR

or Salesman for details on V20 Bond Segments to suit your job. He's listed in the yellow pages under "Abrasives" or "Grinding Wheels" and he's always at your service with expert counsel on any grinding problem—plus prompt deliveries for every abrasive product you need. Or write to The Carborundum Company, Dept. AM 81-410, Niagara Falls, New York.

CARBORUNDUM

REGISTERED TRADE MARK

81-410

Story of a Reliefer that became the No. 1 Starter

IT CAN HAPPEN with machines as well as men. Ask the Powers Regulator Company of Skokie, Illinois—manufacturer of automatic temperature and humidity control systems.

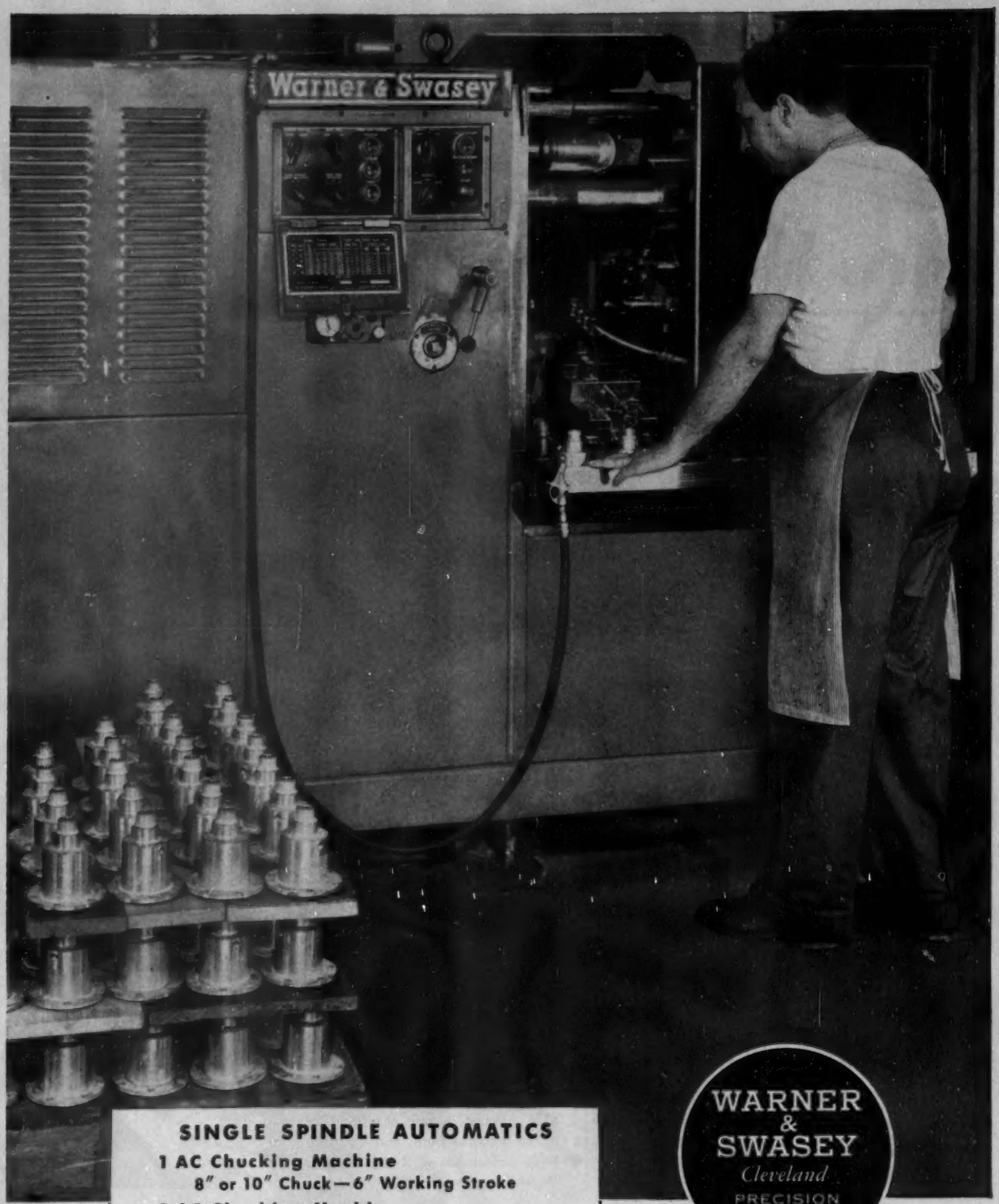
Powers Regulator, like many companies, was faced with the necessity of increasing production of a battery of turret lathes, some of which needed replacement. They also wanted to call in some of their subcontracted work. So they bought a Warner & Swasey 1 AC Single Spindle Automatic to help take the pressure off their hand-operated machines.

This company soon discovered that they had never fully realized the tremendous work potential of the 1 AC. It kept taking over more and more turret lathe work—increasing the production on some of the more complex pieces as much as three times. So the company scheduled the 1 AC for additional shifts—still more work.

The machine really did the job cut out for it! It eased the load on the turret lathes, and the company recovered work previously subcontracted. It performed so well, in fact, that Powers Regulator has since added a second 1 AC.

This story is not unusual. The 1 AC's quick setup and extreme accuracy make it ideal for increasing production on many turret lathe jobs—while requiring less skilled operators. And its advantages as an automatic cuts costs on short and long run jobs. But find out how the 1 AC will boost profits in your plant—call in our nearest Field Engineer for all the facts.

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER &



SINGLE SPINDLE AUTOMATICS

1 AC Chucking Machine
8″ or 10″ Chuck—6″ Working Stroke

2 AC Chucking Machine
10″ or 12″ Chuck—9″ Working Stroke

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

IT'S NEW...IT'S NEWS!

...this 360° Bearing Counter

Smaller and more compact than ever, this new 360° Bearing Counter gives users several *bonus* advantages: It can be either base-mounted, or face-mounted flush with a panel surface. It will run at 1500 rpm constant speed or 2500 rpm on intermittent service . . . and it comes equipped with Geneva Transfer.

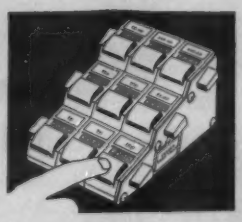
Added Evidence that —

Everyone Can Count on VEEDER-ROOT

This is another Veeder-Root "first" . . . the latest of one of hundreds of standard and special Veeder-Root Counters for every mechanical and electrical application. What do *you* want to count? Write:

ANOTHER NEW VEEDER-ROOT "FIRST"

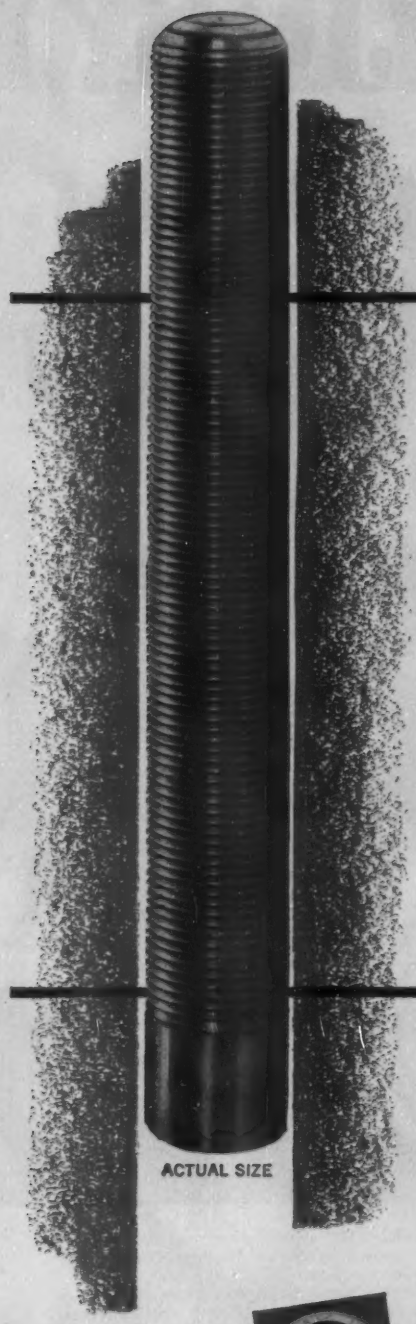
New *Vary-Tally* Multiple-Unit Reset Counter gives you quick finger-tip count of anything countable. Comes in any combination up to 6 banks high, and 12 units wide (minimum of 2 units wide). Write for news sheet and prices.



VEEDER-ROOT INCORPORATED • HARTFORD 2, CONNECTICUT

Chicago 6, Ill. • New York 19, N. Y. • Greenville, S. C.
Montreal 2, Canada • Dundee, Scotland
Offices and Agents in Principal Cities

"The Name that Counts"



when the odds don't have it...

Before putting the chips down it is well to realize that reliable machine performance is largely dependent on well balanced tooling. If it is a multiple spindle bar automatic, an even number of work spindles provides a better opportunity for balance than an odd number.

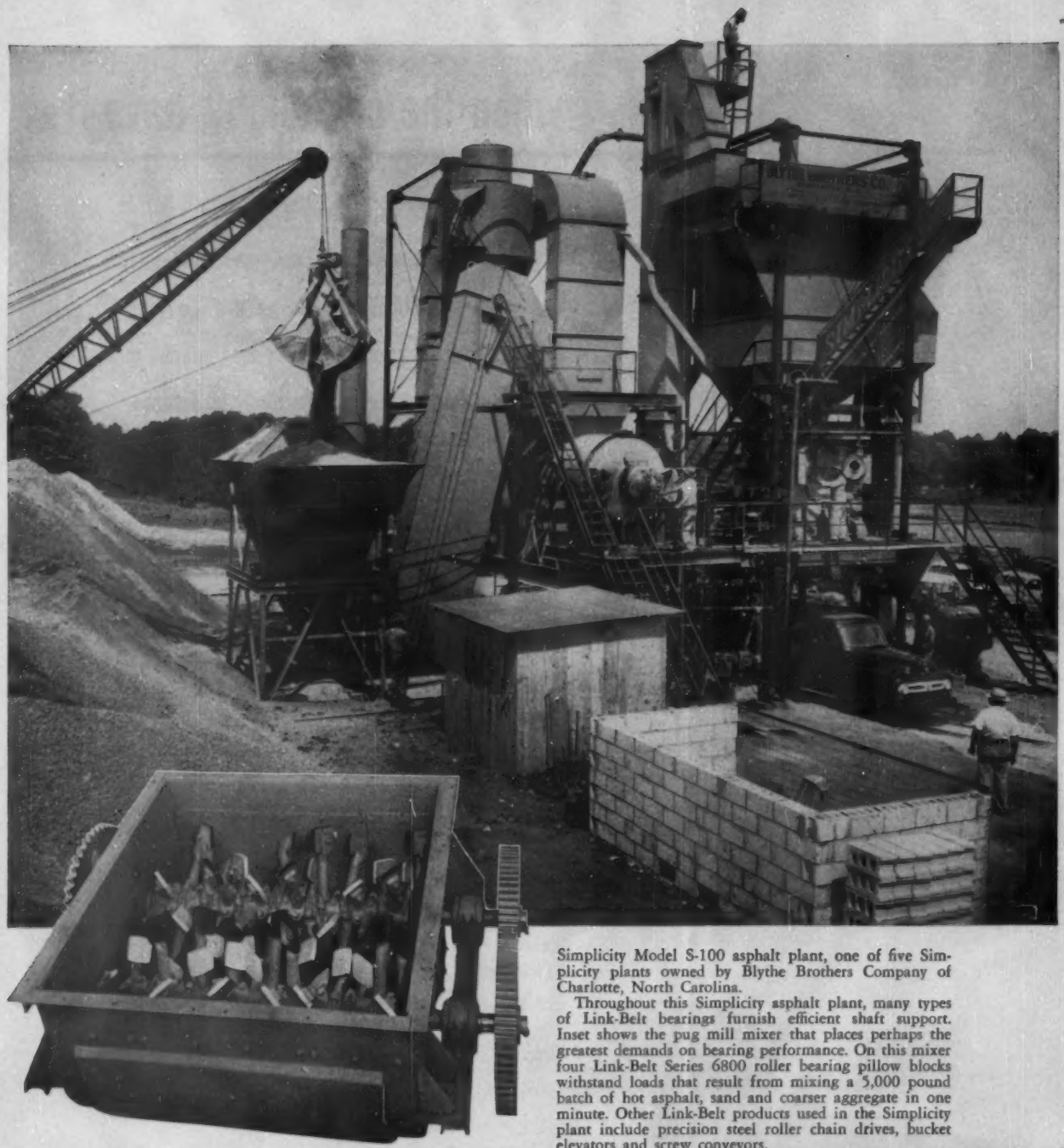
Odd or even, the work spindles are only one of many important considerations in the selection of an "automatic". Other factors also important to the individual machine user are suggested by the new Conomatic General Datalog. Copies are now available.

data for comparison

Part	**Levelling Screw**
Machine	**1⅛" Six Conomatic**
Tools	**100% Carbide Tipped**
Material	**B-1112**
Stock Size	**1" Round**
R. P. M.	**Work Spindle — 958** **Opposed Spindle — 677**
Time	**7.25 Seconds per Cycle** **3.6 Seconds per Piece**

Conomatic} CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

TOUGH JOB?



Simplicity Model S-100 asphalt plant, one of five Simplicity plants owned by Blythe Brothers Company of Charlotte, North Carolina.

Throughout this Simplicity asphalt plant, many types of Link-Belt bearings furnish efficient shaft support. Inset shows the pug mill mixer that places perhaps the greatest demands on bearing performance. On this mixer four Link-Belt Series 6800 roller bearing pillow blocks withstand loads that result from mixing a 5,000 pound batch of hot asphalt, sand and coarser aggregate in one minute. Other Link-Belt products used in the Simplicity plant include precision steel roller chain drives, bucket elevators and screw conveyors.

LINK-BELT ball and roller bearings keep company with

READY ANSWER!

Asphalt plant builder standardizes on LINK-BELT BEARINGS

ONE of the toughest assignments for any bearing is in an asphalt plant. Temperatures up to 300°F . . . ever-present abrasive grit and dust . . . long hours of operation . . . sudden shock loads. Simplicity System Company of Chattanooga, Tenn., pioneered the use of anti-friction bearings on equipment of this type in 1925. And after trying many makes of bearings, they *standardized on Link-Belt* ten years ago.

It's the same story on more and more of America's hardest working machines. Design and consulting engineers find precision-built Link-Belt bearings the long-life answer to severe service conditions. Completely housing-sealed, these bearings maintain peak efficiency even with shaft deflection or misalignment.

There's a Link-Belt ball or roller bearing for almost every industrial need. And there's a bearing expert in the Link-Belt office near you to help you apply them. For complete engineering cooperation, call him today. Or write for Data Books 2550 and 2565.

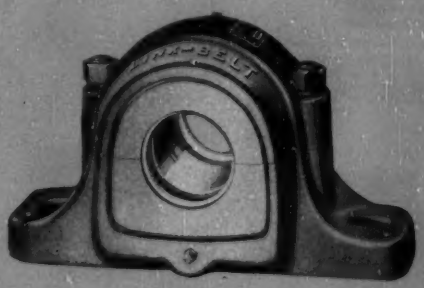
LINK-BELT

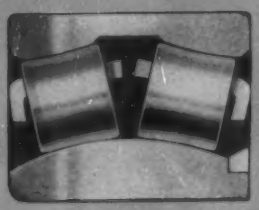
BALL AND ROLLER BEARINGS

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices, Stock Carrying Factory Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 13.493-BU

FACTS for bearing users:

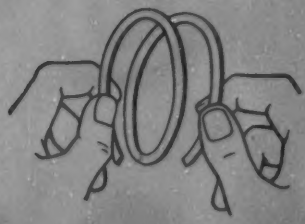
Series 6800 Roller Bearing Pillow Blocks—used on the Simplicity plant—are part of Link-Belt's complete line of pillow blocks, flanged, flanged cartridge, cartridge, take-up and hanger blocks and unmounted bearings. Following are just four of their many outstanding features:





FREE-ROLLING—SELF-ALIGNING—The Link-Belt bearing adjusts immediately in all directions, assuring full load capacity even when subjected to shaft deflections and inaccuracies of mounting. These important features enable the bearing to readily sustain heavy, sudden shock loads.

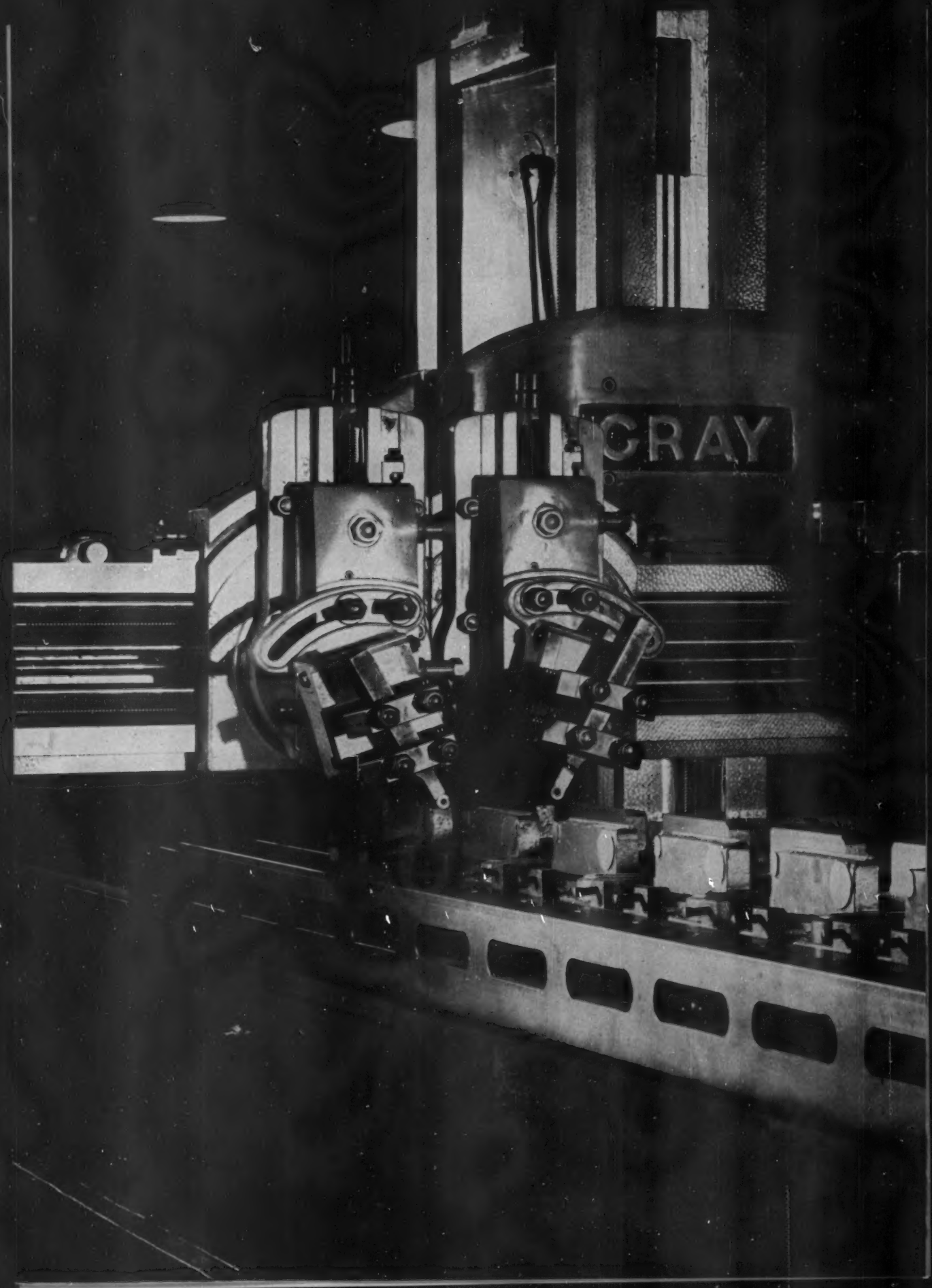
END PLATE can be used for protection where shaft terminates at the bearing. No added machining is necessary.

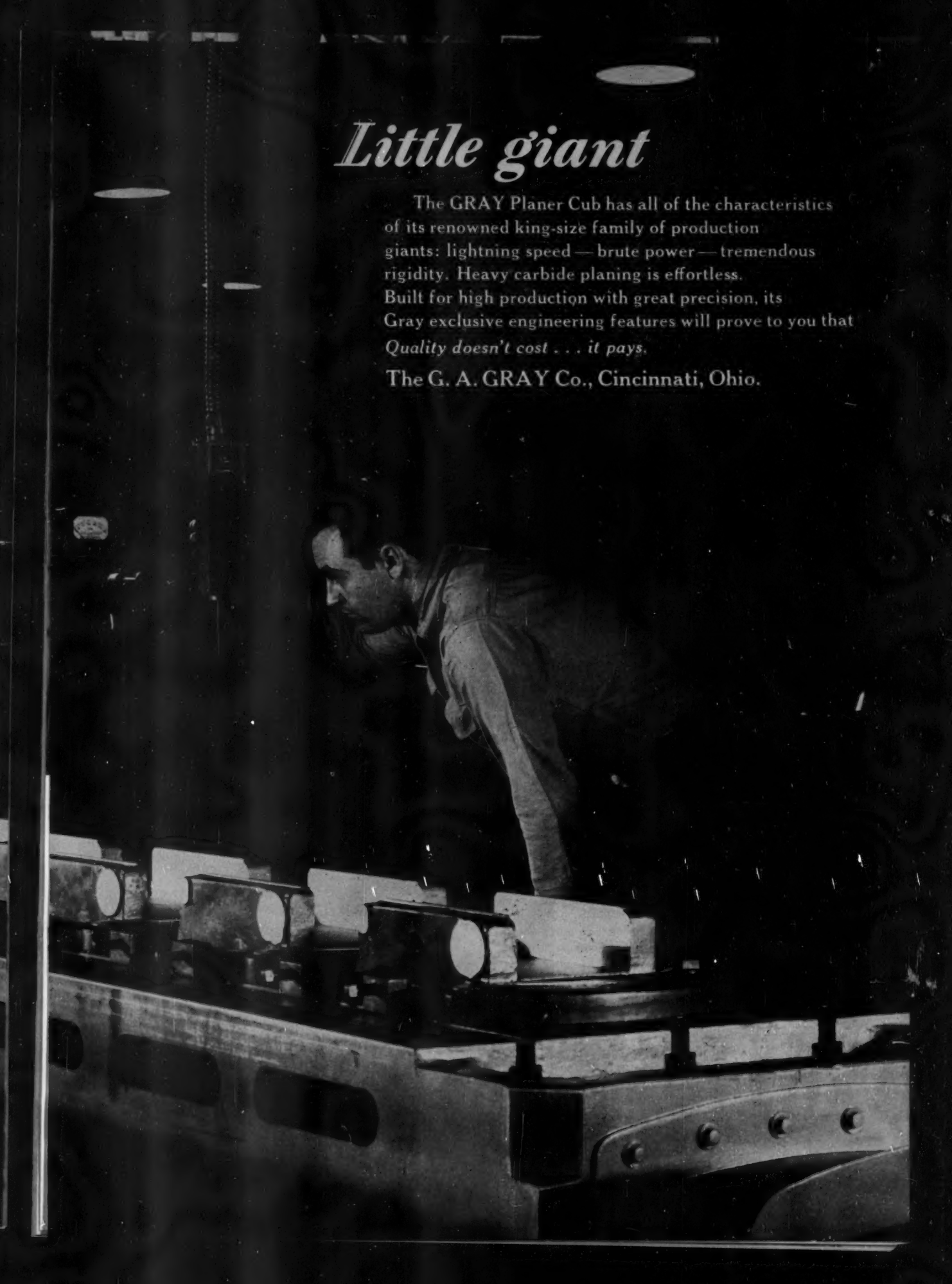


LUBRICATE WITH EITHER OIL OR GREASE—Spiral steel seals provide effective retention of either type of lubricant. What's more, housing sealing fully protects all moving surfaces.

COMPACTNESS is achieved with self-contained design. There are no external rotating parts to mar smooth appearance.

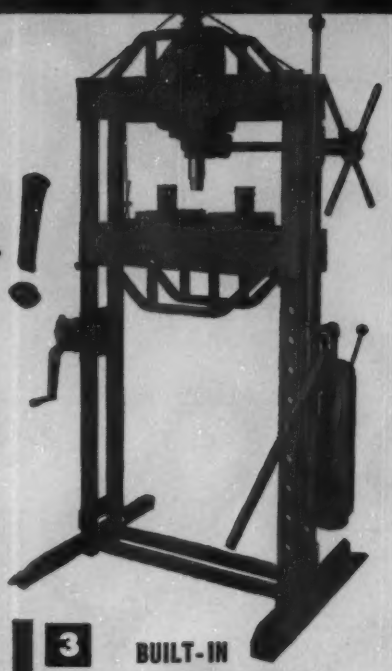
America's hardest-working machines


GRAY


Little giant
The GRAY Planer Cub has all of the characteristics of its renowned king-size family of production giants: lightning speed — brute power — tremendous rigidity. Heavy carbide planing is effortless. Built for high production with great precision, its Gray exclusive engineering features will prove to you that *Quality doesn't cost . . . it pays.*
The G. A. GRAY Co., Cincinnati, Ohio.

KRW is the Best Hydraulic Press You Can Buy!

Let's take one apart and prove it!

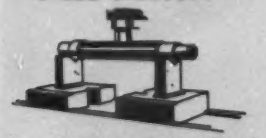


KRW Customers, which includes almost every nationally known company in the United States and Canada, tell us that KRW Presses are the best buy! They have proved it to themselves in day after day, year after year satisfactory performance. Now we want to prove to you why these customers are so right.

1 RAPID APPROACH OF RAM FILLS CYLINDER WITH OIL

The ram is quickly brought down to the work by rotating the "Capstan" handwheel. As the ram descends to the work the cylinder is automatically filled with oil. A flip of the ball arm closes the valve, and the first pumping stroke gives tons of pressure on the work.

2 MACHINED ALL-STEEL V-BLOCKS



KRW all-steel V-blocks (furnished with the press) have machined shoulders which slide on the machined top surfaces of the bed members. This means you can slide the V-blocks along the bed to make quick setups and they're always in alignment. You get solid, rigid, accurate support. No danger of V-blocks tipping or falling between the bed members.

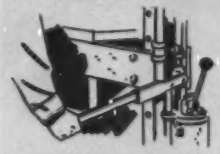
3 BUILT-IN MECHANICAL PRESS

Spinning the "Capstan" handwheel rotates a pinion which engages a rack cut in the ram. The sliding handles in the handwheel can be extended to increase leverage to give a ram pressure of 3 tons. This "built-in" mechanical arbor press gives the operator the advantage of the large bed and its adjustability. It permits the use of the V-blocks when necessary. If more than 3 tons pressure is required close the valve and a few pumping strokes give the needed hydraulic pressure without moving the work from the bed.

4 WELDED TRUSS REINFORCEMENT

The heavy steel bed and crown plates on KRW presses have a special welded truss reinforcement to give them added strength and rigidity with minimum weight. This feature minimizes deflection.

5 CONVENIENT LOCATION OF HYDRAULIC PUMP HANDLE



The KRW pump handle is slightly below waist level, a natural, comfortable position which enables the operator to work for long periods of time without fatigue. He can exert whatever strength necessary easily and efficiently. It's a man-saving feature that results in better, more accurate work and greater production.

COMPLETE LINE

KRW makes a complete line of one, two and three cylinder Hydraulic presses, 25 to 150 ton capacities; hand operated, air operated or motor driven. Tell us your needs. We'll send you facts, specifications and prices without obligation.

K·R·WILSON

210 Mill Street, Arcade, N. Y.

Designers and Builders of the Right Hydraulic Press to Solve Your Metal-working Problems!

Sure, Westinghouse drives helped us lick a couple of quality problems

The following pages show how Westinghouse matched apparatus and engineering assistance did it

MOTORS cut rejects on a stamping operation
CONTROLS made our job more automatic
GEARMOTORS eliminated service headaches

Coordinated Westinghouse equipment cut our stamping rejects

Working to the customer's own requirements, Westinghouse engineers link electrical equipment with new ideas in metal fabricating. Here is an improved manufacturing process and the coordinated Westinghouse apparatus that makes it go.

Coating machine (pictured at right) covers sheets with a special compound to prevent the sheet's sticking during stamping and forming operations. It's quickly brushed, cleaned, sprayed and dried. The percentage of stamping rejects drops off because the sheet can slide in the stamping machine without tearing. There's less chance of scoring the die, too. Westinghouse provides all the equipment to power machines like this.

New Life-Line® "A" motors are designed with the user's toughest application problems in mind. In addition to its compactness, the new motor has a fortified insulation system, with high thermal stability and resistance to moisture, oils and chemicals. On-the-job greasing isn't required, thanks to the "A" motor's 4-way seal and pre-lubricated bearings. Armorized cast-iron frame provides a housing that stands up to corrosion and physical abuse. Straight-through ventilation makes the Life-Line dripproof regardless of its mounting position.

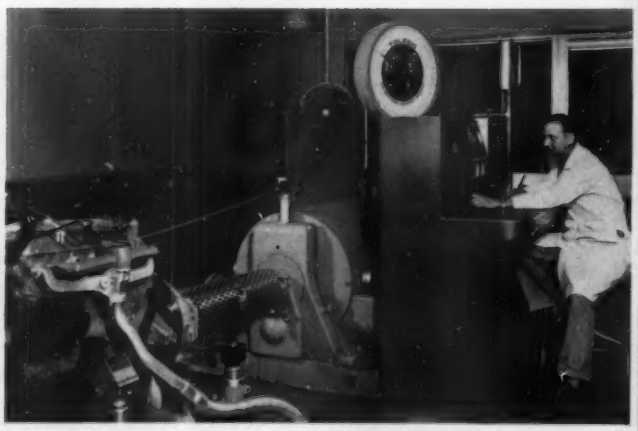
Control panel (bottom of page) features Westinghouse components, carefully coordinated in another automatic cleaning process. Seven Life-Line Starters protect the motor against overloads. A Westinghouse F frame circuit breaker, located in the upper left corner, protects both the motor and control against short circuits. There's a safety interlocked handle mechanism on the enclosure cover. In sharp contrast to starters of conventional armature design, Life-Line Starters seldom require attention. The exclusive Westinghouse knife-edge bearing design drastically reduces friction and wear.

Westinghouse gearmotors have the motor mounted directly on the gear case. This integral design rids you of time-consuming coupling alignment or repair. Exclusive horizontal split case provides a simple, speedy maintenance advantage. Remove a few bolts, lift the gear cover, and all gearing parts are free for removal or inspection. You don't need to drain or disturb the unit's mounting or coupling to the driven load.

YOU CAN BE **SURE**...IF IT'S

Westinghouse

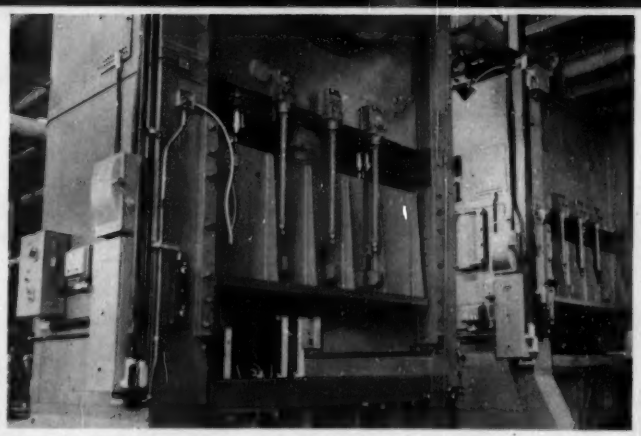
Control panel, outside a dust-tight room, operates shot blasting against forgings to knock off flashings and scale. Westinghouse control handles the sequence from start to stop. When it finishes, it's ready to go again—automatically.



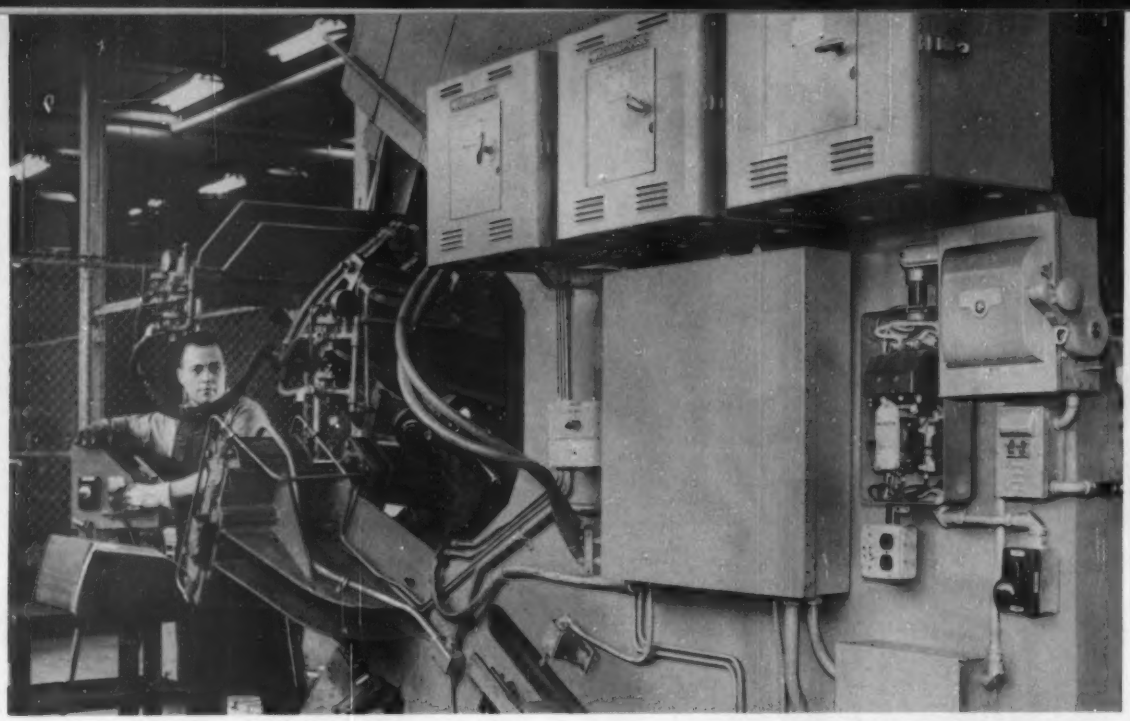
Dynamometers measure output or input torque and horsepower. Westinghouse makes them—rugged but sensitively accurate—with rolled steel stator frames, dynamically balanced armatures, and hydrodynamic trunnion bearings.

Teamwork among Westinghouse 3-hp Life-Line gearmotors (11 of 'em) and starters helps this coating machine prepare sheets for stamping. Westinghouse engineers planned the installation to meet the customer's ideas and requirements.

New Life-Line "A" motor has frame, feet and end brackets of heavy cast iron. Other new Westinghouse features: Bondar insulated wire; Bondite impregnating varnish; unitized stator; balanced, die-cast rotor.



Westinghouse press control improves the output on this stamping press—next job after the coating machine. Westinghouse controls handle each step progressively, automatically, after the operator punches the start button. Safety switch is located at upper right.

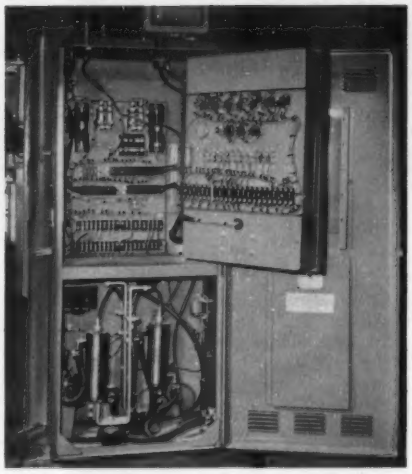


Westinghouse Weld-o-trols improved our welding operation

Westinghouse resistance welding electronic controls are used for precisely timed welding. They handle thousands of amperes. Resistance welders, like the one above, make vacuum-tight welds on every operation. They maintain the correct weld time period day after day, making millions of spot welds without the need for readjustment or mechanical maintenance.

Keep your production going and save you money—those are the twin goals of Westinghouse complete maintenance service. 38 Repair Plants, superbly equipped for repairing all types of electrical apparatus, are at your service. 31 Renewal Parts Warehouses are strategically located in industrial centers. 46 Field Service Offices make on-the-spot repairs of equipment that can't be moved. Call your Westinghouse Representative for these services. Westinghouse Electric Corporation, 3 Gateway Center, Pittsburgh 30, Pennsylvania.

MP 3011



Electronic resistance welding controls are protected by a 600-volt ABI circuit breaker and control the complex welding operation. The operator works the start-stop buttons. There's a safety switch below the control box.

YOU CAN BE SURE...IF IT'S Westinghouse

Industrial Products Advertising
Westinghouse Electric Corporation
3 Gateway Center
Pittsburgh 30, Pennsylvania

Name.....

Company.....

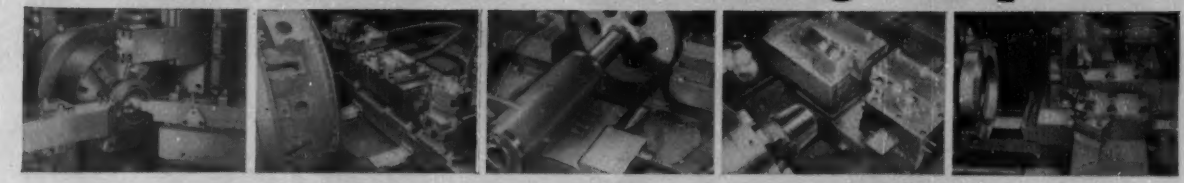
Address.....

City..... State.....

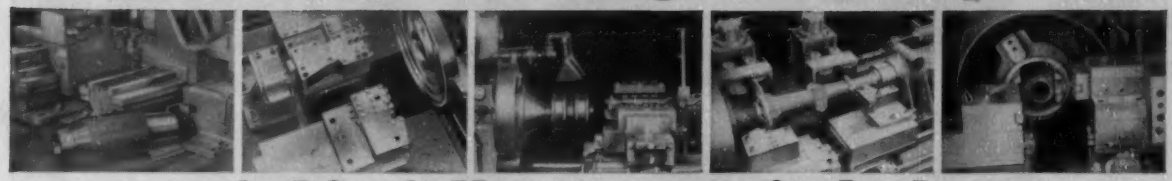
Please send me these books:

- ☐ New Life-Line "A" Motor.....(B-6154)
- ☐ Automatic Control .....(B-5882)
- ☐ AV Drives..(B-5808)
- ☐ Westinghouse Equipment for Automotive Industry....(B-5651)
- ☐ Complete Industrial Control.....(B-6051)
- ☐ Westinghouse Gearmotors.....(B-5645)

All these different tooling setups



show the amazing versatility



# of this fully automatic lathe

...the SIMPLIMATIC

Here's versatility that beats any automatic lathe you ever saw! Actually, the Simplimatic is doing hundreds of jobs like these—jobs that would otherwise be put on *special* machines—built at extra-special cost. But this (and don't miss the important point!) is a *standard machine*—at a *standard price.*

If you have medium or long runs on parts up to 33½" in diameter, get the facts about the Simplimatic Automatic Lathe.

GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES
SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

THIS CATALOG may show you how the Simplimatic can save thousands of dollars for you as it is doing for many others. Write for your copy.

Gisholt Machine Co.
Madison 10, Wisconsin
Gentlemen:
Please send my copy of the Simplimatic Catalog.

Name.....*Title*.....
Company.....
Address.....
City.....*Zone*....*State*.....

intricately machined MAX-EL alloy steel part shows minimum distortion after heat treatment...

Halliburton Oil Well Cementing Company, Duncan, Oklahoma, selected hot rolled MAX-EL 3½ bar stock for the valve shown. It's an important part of their 5⅞" tester, used to sample fluids or gases during drilling operations, sometimes 15,000 to 20,000 feet below the surface.

The valve is machined in the annealed condition and then heat-treated. Even though it varies considerably in thickness, no distortion problems are encountered in this MAX-EL part.

Try MAX-EL in your shop. You'll like its better machinability, freedom from distortion and over-all quality. And you'll get longer tool life . . . more pieces per grind. Call Crucible for immediate warehouse delivery of MAX-EL steels.

CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking **ALLOY STEELS**

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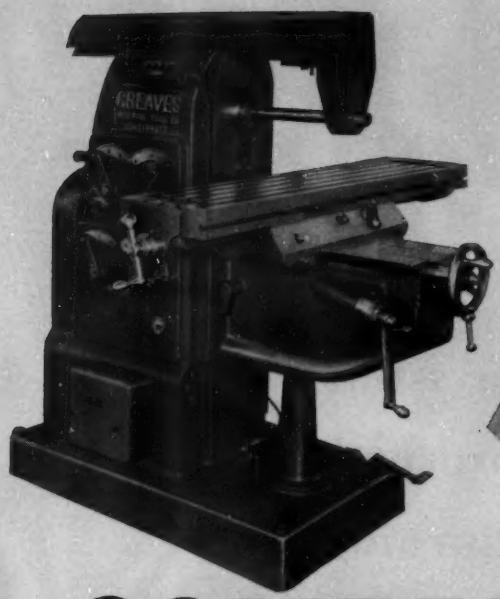

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WRITE FOR YOUR COPY OF THIS EYE-OPENING COMPARISON CHART

GREAVES

. . . WILL BE YOUR CHOICE!

"The Most Mill For The Least Money"

Now you can make the same painstaking comparison that sold and satisfied leading plants on Greaves 2H plain and universal milling machines. A free chart cross-compares 22 significant specifications . . . including speeds, feeds, power and capacity . . . on each of the eight leading milling machines.

Make your own comparison . . . in your office, out on the factory floor or right out of our competitors' catalogs . . . we're convinced you'll find that Greaves is your best buy!

GREAVES MACHINE TOOL COMPANY, 2101 EASTERN AVENUE, CINCINNATI 2, OHIO

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Title_____

Firm_____

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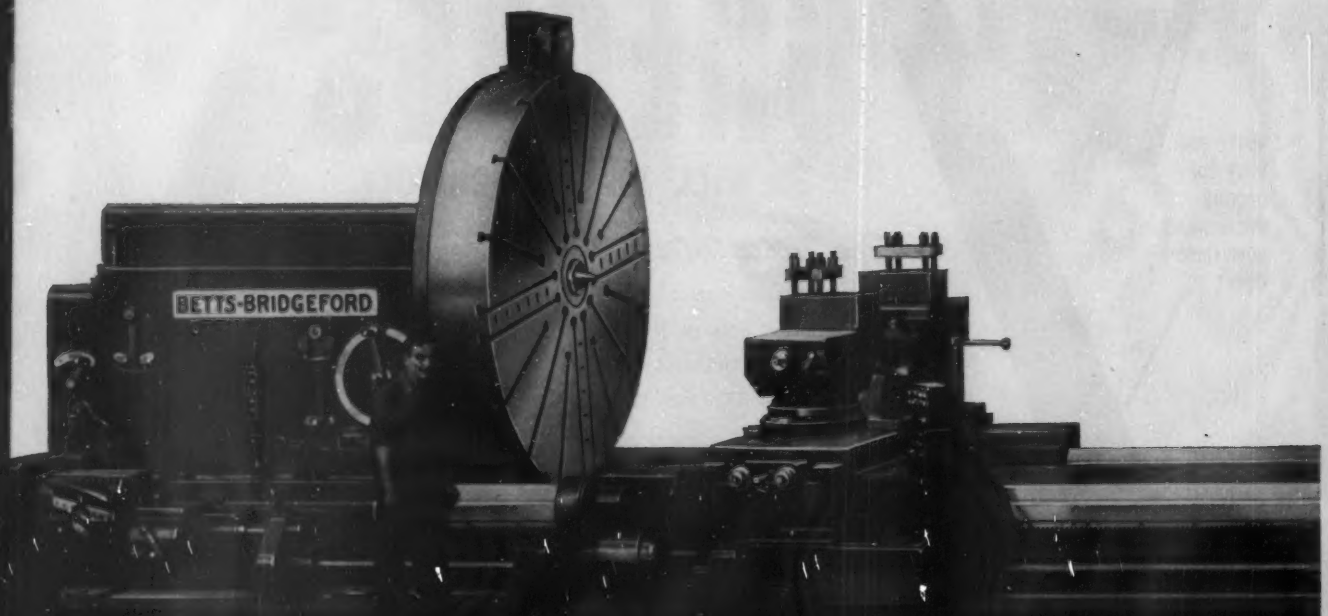
Another Big One!

A 96 Inch Heavy-Duty Betts-Bridgeford Lathe for the precision turning of forged steel steam turbine shafts weighing up to 90 tons!



CONSOLIDATED MACHINE TOOL

Wholly owned subsidiary of Farrel-

Built into the push-button operated tail stock is a big live-center spindle that revolves in precision double-row roller bearings of enormous load carrying capacity.

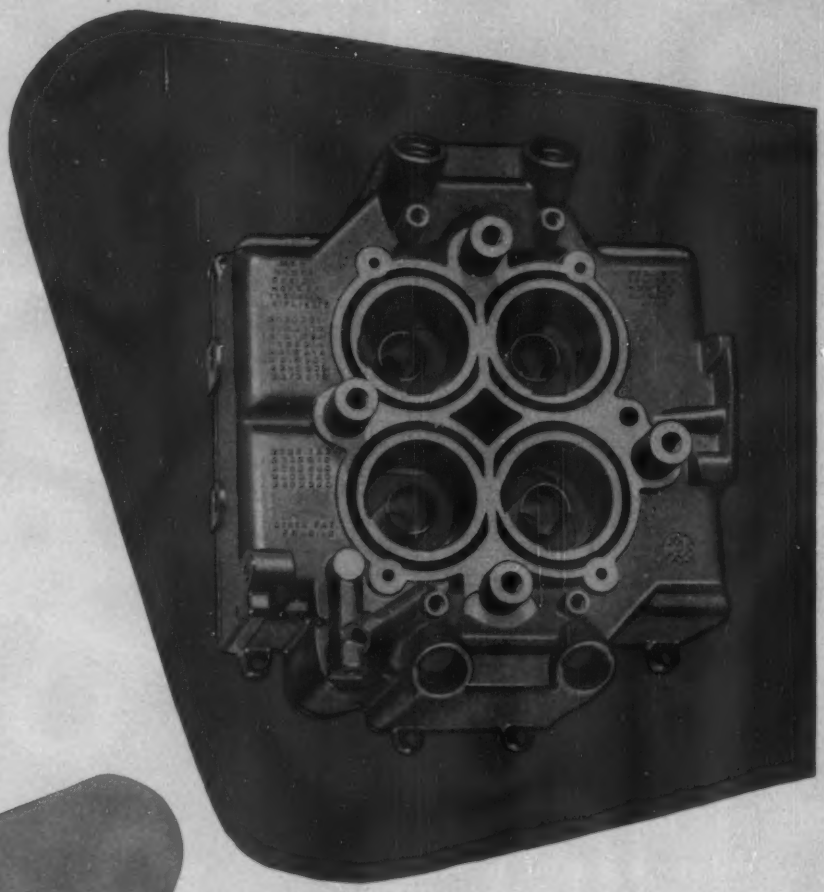
CORPORATION, ROCHESTER, N. Y.

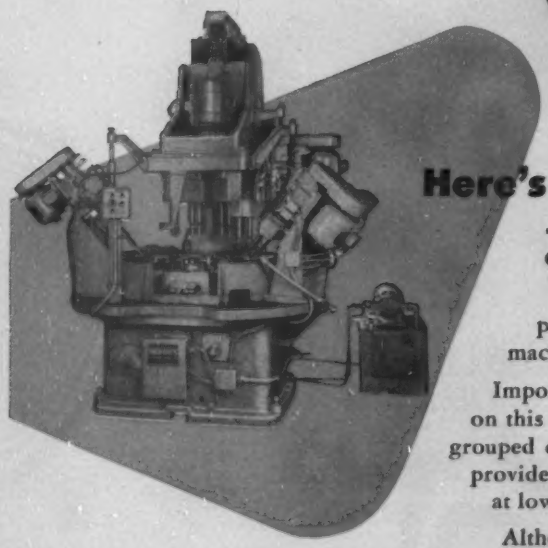
Birmingham Company, Incorporated

How would you do all these operations?

. . . fast, with utmost precision, at lowest cost

DRILL	2	HOLES
TAP	2	HOLES
DRILL	2	HOLES
REAM	2	HOLES
TAP	2	HOLES
FACE	4	SURFACES
CLEANOUT	4	DIAMETERS
FACE	4	SURFACES
TAP	2	HOLES
REAM	2	HOLES
DRILL	2	HOLES
TAP	2	HOLES
DRILL	2	HOLES





Here's the Morris Mor-Speed answer

. . . combining 32 operations, delivering up to 375 parts per hour!

Imagine the machines, and floor space required to do this part on a separate machine basis! Instead, there's just one machine, producing approximately six parts per minute!

Important too, there's no sky-high "special machine" price tag on this or any Morris MOR-SPEED. Standard machining units are grouped on a standard base, around a standard indexing table and provided with the necessary tooling. The result is high production at lowest cost.

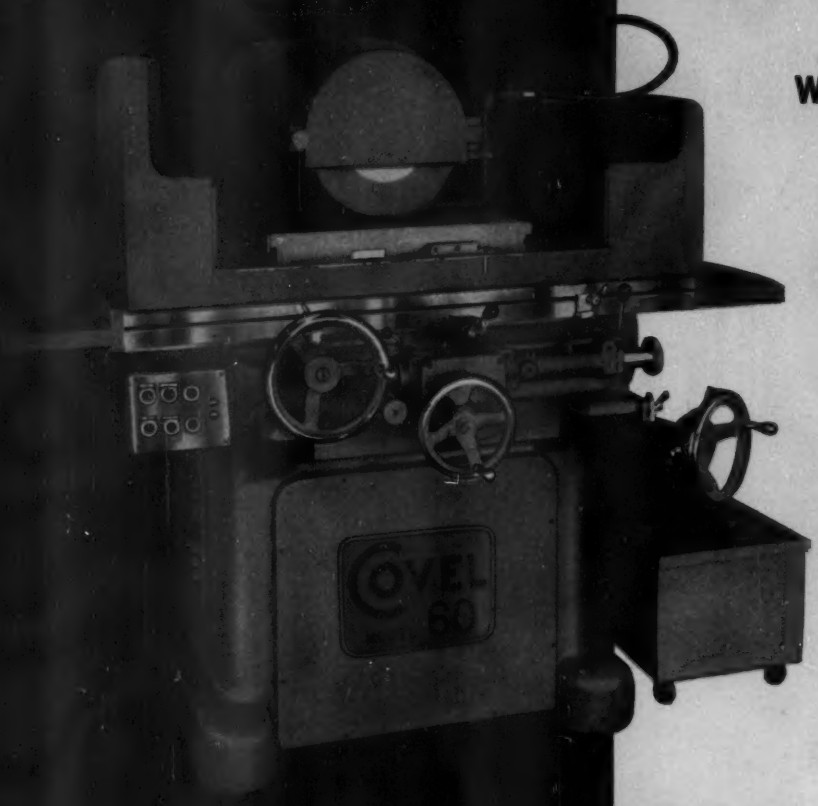
Although your multiple drilling, tapping, reaming and similar operations may not be as complicated as this Morris installation, chances are Morris Engineers can show you proof of substantial savings. Investigate today.

Morris

THE MORRIS MACHINE TOOL COMPANY, 933 HARRIET ST., CINCINNATI 3, OHIO

COVEL No. 60 SURFACE GRINDER . . . ENTIRELY NEW

WITH 15" CROSS FEED



Covel presents the No. 60 — latest in its 80-year line of precision machines . . . This ultra-modern surface grinder features a 14" x 24" work surface . . . 15" width of cross feed . . . 27" table travel . . . vertical work capacity of more than 18" . . . automatic, closed circuit hydraulic system . . . powered elevation and a long list of advantages best described in a new bulletin . . . yours for the asking.

Here's a Typical Use:

This new "60" is set up for wet grinding the surface of a trim die for die castings — but one of the wide range of tool room and production jobs for which this latest Covel grinder is suited.

WRITE FOR *New Bulletin* No. A-114

80 YEARS of continuous manufacturing experience makes your COVEL ——— *choice a sound one*

COVEL PRECISION GRINDERS

BENTON HARBOR, MICHIGAN

DRILL GRINDERS • UNIVERSAL CUTTER & TOOL GRINDERS • HYDRAULIC & HAND FEED SURFACE GRINDERS

For economy, convenience,

versatility in small-lot production and tool work—

THESE COMPANIES USE THE CLEEREMAN LAYOUT DRILLING MACHINES

Bryant Chucking Grinder Co.	Springfield, Vt.
Package Machinery Co.	Longmeadow, Mass.
New Britain Machine Co.	New Britain, Conn.
Federal Telephone and Radio Corp.	Clifton, N. J.
General Electric Co.	Schenectady, N. Y.
R. C. West Tool and Die Co.	Depew, N. Y.
Daystrom Instrument Div.	Archbald, Pa.
Westinghouse Air Brake Co.	Wilmerding, Pa.
Naval Gun Factory	Washington, D. C.
The Thew Shovel Co.	Elyria, Ohio
The Reliance Electric and Eng. Co.	Ashtabula, Ohio
The Arbor Tool Co.	Dayton, Ohio
The Cincinnati Milling Machine Co.	Cincinnati, Ohio
Allied Products Corp.	Detroit, Michigan
J. F. Mulkey Co.	Detroit, Michigan
Allis-Chalmers Mfg. Co.	La Porte, Ind.
National Automatic Tool Co.	Richmond, Ind.
Le Roi Company	Milwaukee, Wisc.
Hyster Co.	Peoria, Ill.
Fisher Governor Co.	Marshalltown, Ia.
Buick-Olds-Pontiac Div.	Kansas City, Kansas
Chance Vought Aircraft	Dallas, Texas
Products Engineering Co.	Houston, Texas
Continental Can Co.	Seattle, Wash.
Dalmo Victor Co.	San Carlos, Calif.
Douglas Aircraft Co.	Santa Monica, Calif.
Axelson Mfg. Co.	Los Angeles, Calif.

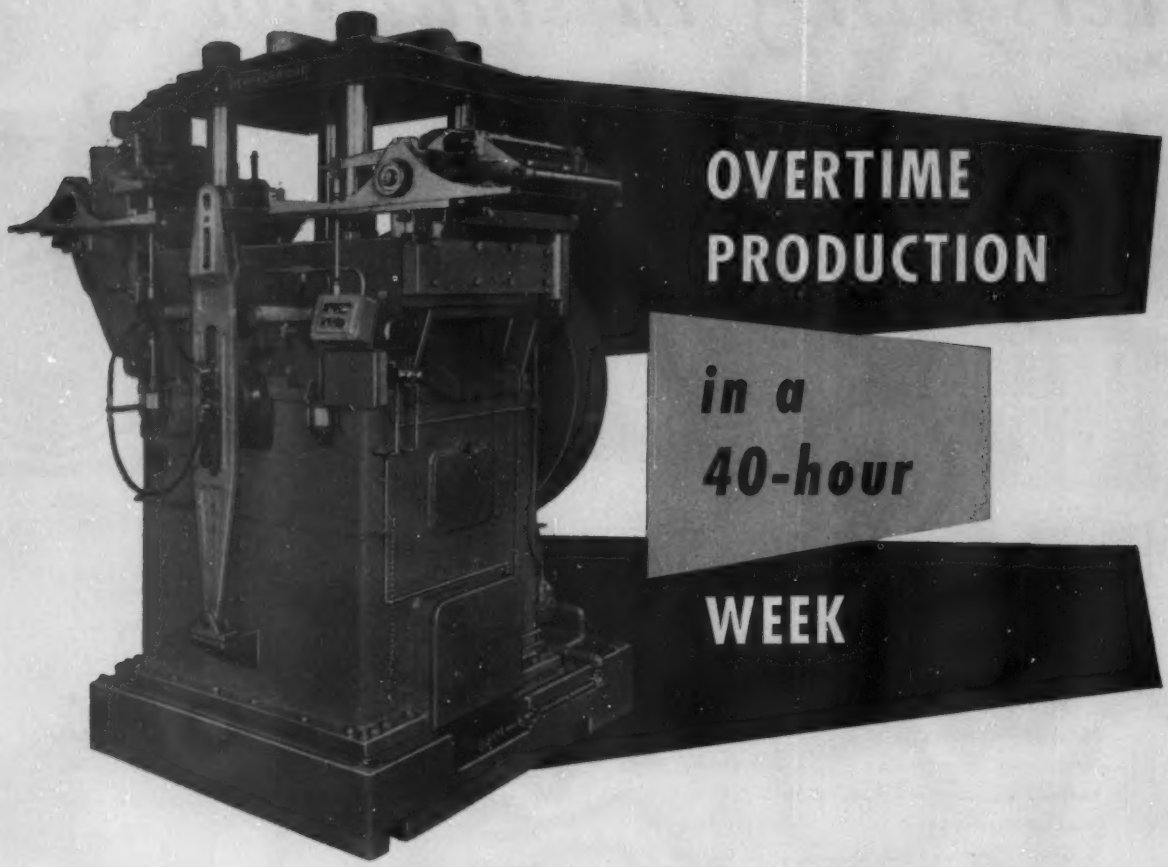
This Cleereman enables F. J. Littel Company, Chicago, to build and alter jigs in their own shop with none of the usual inconvenience. The machine eliminates the need (and cost) of jigs for Littel's small-lot production of roll feeds, straighteners and press accessories.

The Cleereman layout drilling machine has proved its capacity for small lot production and general tool work. If you will survey your own operations (or simply ask us to do it for you), it is more than likely that you will find an area in which it will help you cut costs. For the companies listed above, the Cleereman layout drilling machine has done exactly that!

AFFILIATED WITH

CLEEREMAN MACHINE TOOL CO. Green Bay, Wisconsin

BUILDERS OF PRECISION JIG BORERS AND DRILLING MACHINES



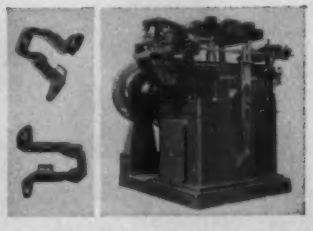
OVERTIME PRODUCTION in a 40-hour WEEK

If you have to produce more in a given time — the proven answer is a Henry & Wright Dieing Machine. Here is the capacity that enables you to keep pace with sudden scheduling changes; the consistent accuracy that permits you to set and automatically meet higher standards of work quality, while reducing cost.

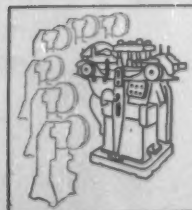
In the Henry & Wright Dieing Machine, you have a production tool designed for high speed, built to widen radically the practical application of progressive stamping and engineered to prolong the life of your dies. Outstanding in its application for light and medium gauge metals, the Dieing Machine is also demonstrating that it can achieve equally extraordinary results in stamping and forming heavy gauge parts.

You owe it to yourself to include the Henry & Wright Dieing Machine in your plans for modernization, expansion or replacement. We welcome an opportunity to discuss its specific application to your requirements.

25-ton Henry & Wright Dieing Machines with twin die set-ups produced 435 parts per minute per machine at Barber-Colman.



200-ton Henry & Wright Dieing Machine producing 54 completed hinge boxes per minute from 5/32" x 13" steel in coil form.



ONE SET UP INSTEAD OF MANY WITH H&W DIEING MACHINES

***HELPFUL DATA** is available in our fact-packed catalog which you can have by writing Henry & Wright, 481 Windsor St., Hartford, Connecticut.*

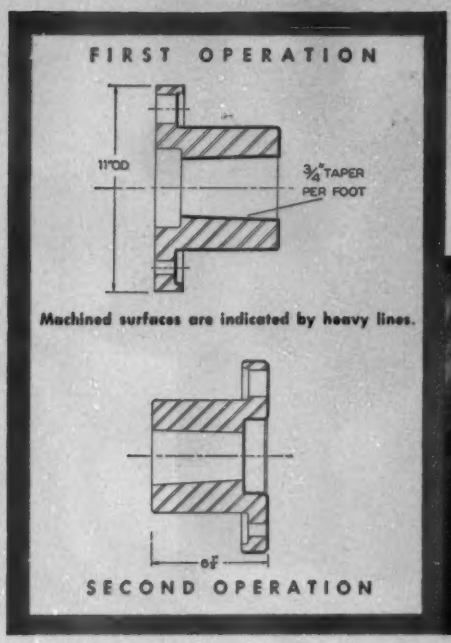
HENRY & WRIGHT

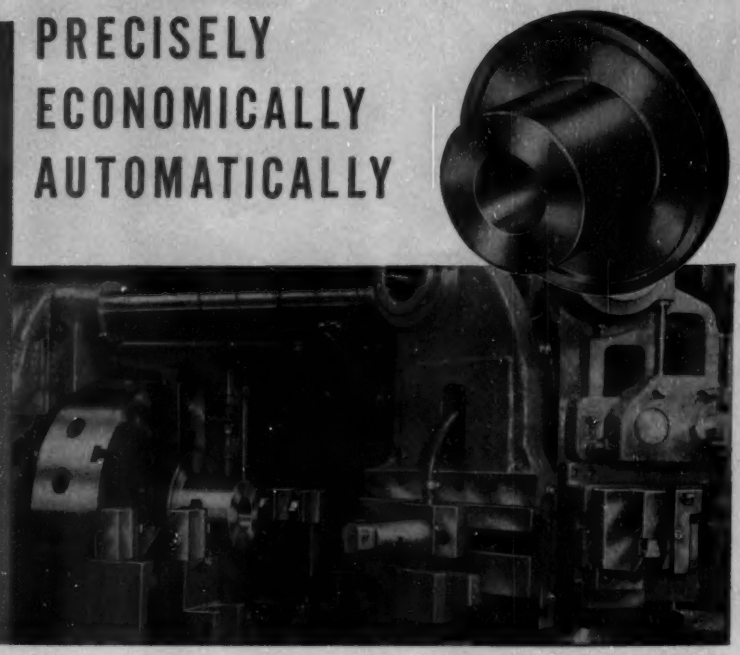
DIVISION OF EMHART MFG. CO.

HARTFORD, CONNECTICUT

How to TAME a TOUGH FORGING

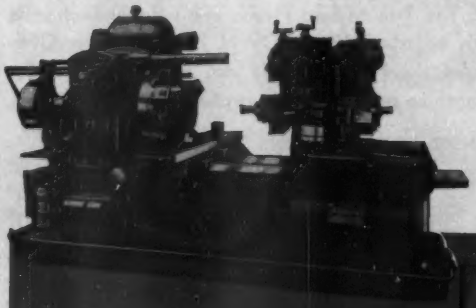
PRECISELY
ECONOMICALLY
AUTOMATICALLY





Use the POTTER & JOHNSTON 6-DRE POWER-FLEX
AUTOMATIC TURRET LATHE

This 11" diameter steel forging required power to drill the 3" diameter hole through from the solid and to remove stock rapidly for final precision size turning. The P & J 6 DRE finished the piece in two operations, performing the machining of the tapered bore by using a single-point slide tool. The most effective speeds and feeds for each operation were preselected and automatically repeated. An automatic air-operated chuck increased output with less operator fatigue. More machines were handled by each man.



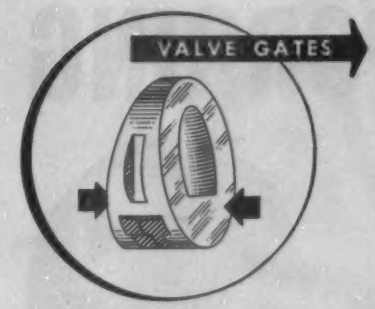
This is a typical example of the way P & J Tooling has helped others, and can help you take full advantage of the profitable productive rates possible with this automatic. Let us be on your side working for profits. Send for your copy of Bulletin 128, or call your nearest Pratt and Whitney branch office. Tooling recommendations and production estimates will be yours at no obligation.

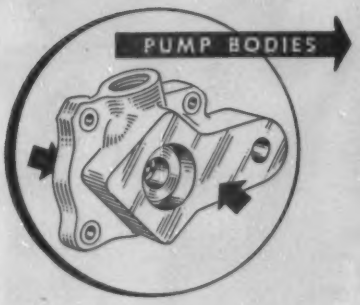
MODERNIZE with POTTER & JOHNSTON REPLACE FOR PROFIT

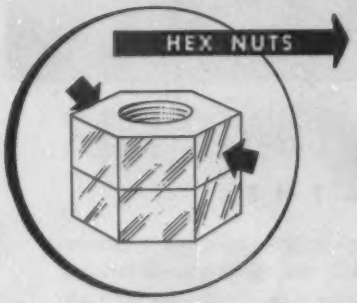
POTTER & JOHNSTON CO.
PAWTUCKET, RHODE ISLAND
SUBSIDIARY OF
PRATT & WHITNEY
DIVISION NILES - BEMENT - POND COMPANY

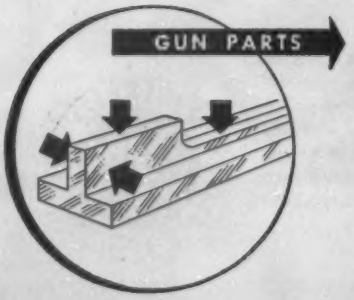
P&J

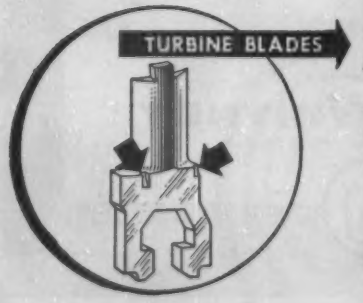
PRECISION PRODUCTION TOOLING FOR OVER FIFTY YEARS

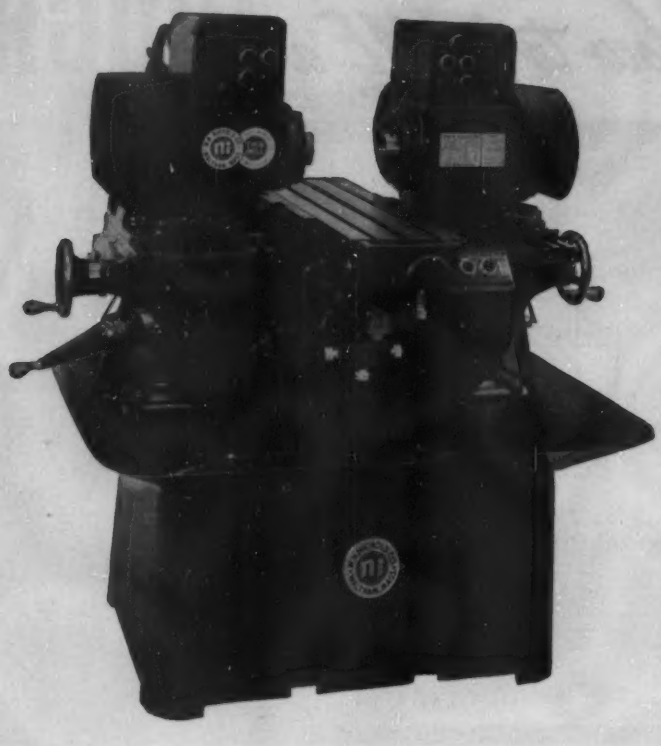












on the NEW *Nichols* TWIN MILL

The TWIN MILL cuts milling costs in half on many jobs. It handles **TWO** milling operations at a time, yet requires but **ONE** fixture and **ONE** operator. Designed for the class of work usually assigned to Hand Millers or light Automatic Production Millers, the Twin Mill's speed, accuracy, and exceptional flexibility add up to increased output at lower cost. **New** Spindle Retraction automatically withdraws cutters at the end of each cutting stroke. **New** Spindle Brakes act instantly after cycle is completed. The Two Milling Heads are independent units with individual motor drives, quickly adjusted UP or DOWN, IN or OUT, or OFF-SET longitudinally. Machine handles short run or long run work economically. Automatic table cycle and entire machine push-button controlled. Write for details.

CONDENSED SPECIFICATIONS

Table, working surface	8⅝"x 30"
Table, travel—cutting stroke	11¾"
Motors	(two) 1 HP
Maximum height center of spindle above table	11¾"
Maximum offset of spindles (horizontal)	8½"
Maximum distance between spindle noses (across table)	16"
Floor space required	64"x56"
Spindle Speeds (15)	from 55 to 2050 R.P.M.

Manufactured by W. H. Nichols Co., 48-U Woerd Ave., Waltham 54, Mass.

Have you seen the new Nichols' movie, "The Miller That Uses Its Head"? It's available for showing in your plant.

Also available are NICHOLS Hand Millers, NICHOLS two-spindle millers with identical or opposed spindles, and with or without pneumatic feed.

Please address inquiries to

NICHOLS-MORRIS CORPORATION 76-F MAMARONECK AVE. WHITE PLAINS, N. Y.

Dealers in Principal Cities

Tests Prove That CIMCOOL With "95-16" Doubles Rust-Control

This is not a "blue-sky claim"! Actual scientific laboratory and shop tests prove that CIMCOOL® with "95-16" *doubles rust-control* compared with a formula without this amazing ingredient.

But doubling rust-control is *just one of many reasons* why more and more plants are switching to CIMCOOL. This radically new and different coolant—this *chemical emulsion*—saves you money many important ways. Plant after plant reports that CIMCOOL covers 85% of all metal cutting jobs . . . and does a better job. It permits faster speeds because it combines friction reduction and cooling capacity in a degree never before attained by old-fashioned coolants. It's longer lasting in machines. So CIMCOOL reduces downtime and cuts labor costs for cleaning and changing.

Let us prove to you what scientific tests and on-the-job experience have already proved. Put CIMCOOL to the test in your own plant—on your own machines. For a demonstration write, wire or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

®Trade Mark Reg. U.S. Pat. Off.

CIMCOOL

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

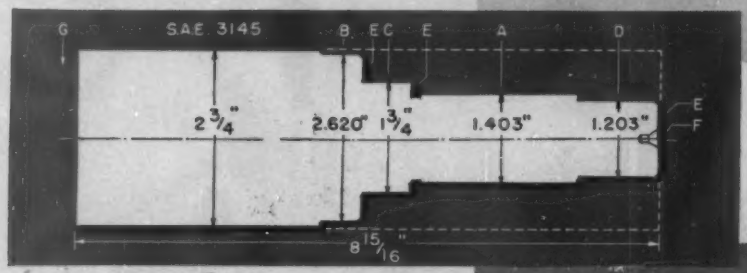
This is the difference High Velocity Turning makes

IN 1950 this job took...

12.40 min.

FLOOR TO FLOOR

A. Turn 489 RPM — .011 feed
B. Turn 340 RPM — .022 feed
C. Turn 489 RPM — .011 feed
D. Turn 489 RPM — .011 feed
E. Face end, shoulders & neck 489 RPM — .0055 feed
Chamfer
F. Center drill
G. Cut off 82 RPM — .0035 feed H.S.S.



IN 1954 this same job takes...

5.40 min.

FLOOR TO FLOOR

A. Turn 694 RPM — .022 feed
B. Turn 694 RPM — .022 feed
C. Turn 694 RPM — .022 feed
D. Turn 694 RPM — .022 feed
E. Face end, shoulders and neck — 694 RPM — .055 feed
Chamfer
F. Center drill
G. Cut off 489 RPM — .0025 feed

J & L TURRET LATHES GIVE...

MORE Ease of Operation
MORE Power Transmission
MORE Rigidity
MORE Accurate Stops
MORE Efficient Lubrication
MORE Coolant on Cutting Tools
MORE Accurate Results

Visitors who attend J & L's periodic "Production Studies" Seminars see this job turned out in just 5.40 min. on a Jones & Lamson ‡7A Universal Turret Lathe.

Only with lathes like this, built with plenty of power and the beef to back it up, can your shop take full advantage of the quality, productivity and lower costs offered by High Velocity Turning.

This job is one of the many turned at high speeds on our production line. Come to Springfield and see for yourself. At any rate, send for catalogs #101-A and #102.

JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., 502 Clinton St., Dept. 710, Springfield, Vt., U.S.A. J&L MACHINE TOOL DIV.

80% saving on lubrication costs

by just letting Pure Oil help them SIMPLIFY AND SAVE!

HERE'S HOW YOU CAN SAVE

1. **Reduced inventory**
2. **Simplified inventory control**
3. **Reduced labor cost**
4. **Reduced errors in application**
5. **Simplified lubrication**
6. **Speeded-up purchasing**

• • •

Be *sure* with Pure. Sales offices located in more than 500 cities in Pure's marketing area.

When a West Virginia coal mine found they were spending more than 5¢ per ton for lubrication, and loss of tonnage through breakdown was even more, they called in Pure Oil.

Within six weeks Pure Oil engineers had cut the cost down to 1¢ per ton (a savings of 80%). How? By selecting lubricants better suited to protect the machinery and, by setting up a lubrication program based upon a survey. Reducing the number of lubricants from seven to four resulted in smaller inventory and less waste. An unusual case, to be sure. Yet sizable savings have been accomplished in all types of mines, mills and factories by similar Pure Oil methods.

Send for this *free* booklet which tells you how you can *Simplify and Save* on lubrication, too!

IT STARTS HERE

PURE OIL
INDUSTRIAL
LUBRICANTS

FREE BOOKLET

The Pure Oil Company, Industrial Sales Dept. A-45
35 E. Wacker Drive, Chicago 1, Illinois
Please send me your free booklet on how to "Simplify and Save"

NAME_____

POSITION_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE____

100% INSPECTION

Quality Control Costs Less with this Federal semi-automatic electronic sorting gage. It simultaneously measures four dimensions of plastic sleeve assemblies . . . divides pieces into four categories: (1) All dimensions good; (2) O.D. oversized; (3) I.D. of holes undersized; (4) rejects.

100% Inspection Pays as this Federal Electronic Sorting Gage automatically measures 8000 roller bearings an hour. It checks their O.D. and length . . . sorts into 12 acceptable classifications 0.0001" apart . . . sends off-size bearings to "scrap" or "salvage".

IS NOW PROFITABLE!

QUALITY VS. COST IS NO LONGER A BATTLE in many mass-production plants. Their process, production and quality control engineers have struck a perfect balance. They did it by installing high-speed measuring, dimensional control and sorting equipment in their production lines.

HOW CAN YOU IMPROVE QUALITY WHILE INCREASING PROFITS? It's easy to find out. Just send for the bulletin "High-Speed Automatic Gaging and Sorting by Federal". It shows how Federal automatic gages are achieving results like these:

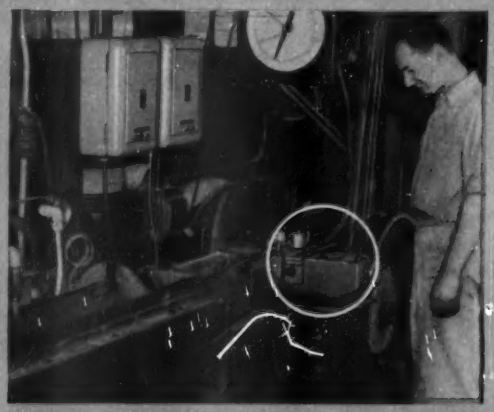
1. **Slashing rejects as much as 35%** while sorting into 16 size categories 0.0001" apart.
2. **Maintaining accuracies of better than 0.00005" all day long** by measuring work in process and automatically adjusting the machine to hold tolerances.
3. **Inspecting and sorting for 9 separate specifications** at a speed of more than 3000 pieces an hour.
4. **Sorting 7200 odd-shaped pieces an hour** into 5 "good" groups while rejecting "bad" pieces for either of two wrong angles.

SEEING'S BELIEVING! These and more than 40 other case studies are covered in detail in Federal's bulletin 72 on "High Speed Automatic Gaging and Sorting". It will help engineers: (1) Federal has already solved your sorting or dimensional control problem; (2) An existing Federal gage may be easily adapted for your purposes; or (3) Federal engineers can develop the gage that will make 100% inspection pay off for you. So, write for your copy today. Federal Products Corporation, 4125 Eddy Street, Providence 1, Rhode Island.

Ask **FEDERAL**

FOR ANYTHING IN MODERN GAGES...

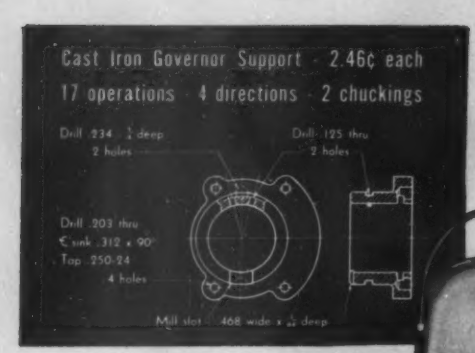
DIAL INDICATING, AIR, ELECTRIC OR ELECTRONIC — FOR INSPECTING, MEASURING, SORTING OR MACHINE SIZE CONTROL.

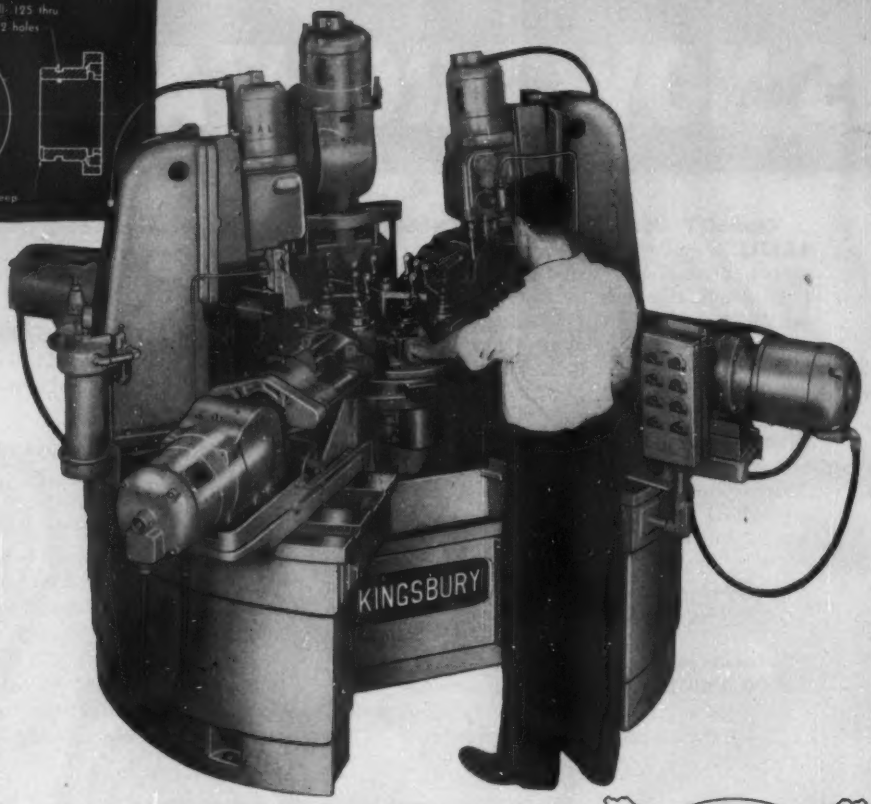


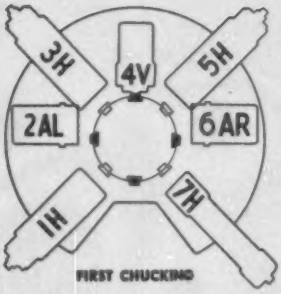
Production is More Uniform with this Federal machine-control, continuous-measuring gage. It automatically speeds up or slows down the wire coating machine to maintain a uniform thickness of plastic or rubber insulation.

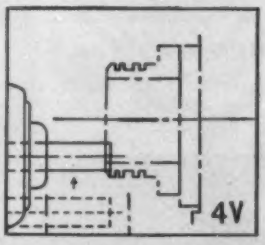
Sorting is Faster, More Accurate as this Federal automatic gage measures and sorts automotive piston pins at a rate of more than 3000 an hour. Located at the exit side of a centerless grinding machine, it also directs acceptable pins to packagers.

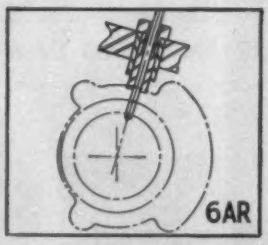
"Operations Kingsbury"

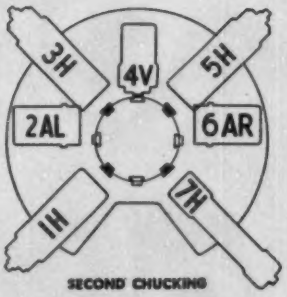

Cast Iron Governor Support · 2.46¢ each
17 operations · 4 directions · 2 chuckings
Drill .234 · ½ deep
2 holes
Drill .125 thru
2 holes
Drill .203 thru
C'sink .312 x 90°
Tap .250-24
4 holes
Mill slot · .468 wide x 5/64 deep











Follow this Kingsbury Automatic Machine as it performs

Actually better than that! It drills 8 holes, c'sinks and taps 4 of them, and mills a slot at the rate of 218 pieces per hour gross.

The part is a cast iron governor support small enough to palm in your hand. Print calls for 8 holes and a milled slot — 17 operations from 4 directions. Three operations are required at one end of the piece and 14 operations at the other. It was decided to accomplish these on one machine in two chuckings.

The machine has an 80-inch base with seven working units: four Horizontal Units (H), one Vertical Unit (V) and two units operating downward at an angle (AL left and AR right). The 30-inch Index Table has eight fixtures, four for each chucking. By means of selective tripping, the first chucking operations are performed at Stations 2, 4 and 6; the second chucking operations are performed at Stations, 1, 3, 5, and 7.

First Chucking

Station 2: Unit 2AL drills .125 hole through at angle 15° left.

Station 4: Unit 4V mills slot .468 wide x 5/64 inch deep through wall of part.

Station 6: Unit 6AR drills .125 hole through at angle 15° right.

produces interchangeable parts at low cost

"Operations Kingsbury" will provide you with parts of uniform accuracy . . . parts which will slip into your assemblies without reworking. Your part can be of any material that can be machined within the limits of 5 HP units and handled by one operator.

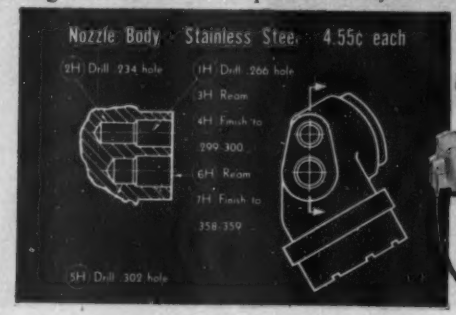
This broad claim is based upon field experience with more than 4,000 custom-built Kingsburys; a plant equipped with the most modern machine tools; a staff of experienced engineers and craftsmen specializing in this one line; and pride in doing it well.

Accuracy begins at home. Precision-built work-holding fixtures locate the part correctly for each tool. Precision ball bearings and bushing guides insure close tolerances. Predetermined feeds and speed are uniform and constant: multiple spindle heads are used only when it is safe to do so.

"Operations Kingsbury" offer additional money-wise advantages. Your scrap loss will be reduced to a minimum. You'll save floor space, set-up time and intra-machine rehandling.

Are you a good prospect? If so, we should like to see you.

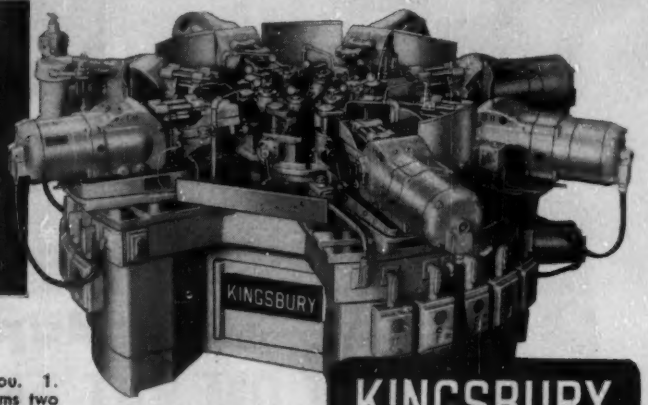
Kingsbury Machine Tool Corp.
106 Laurel Street, Keene, N. H.



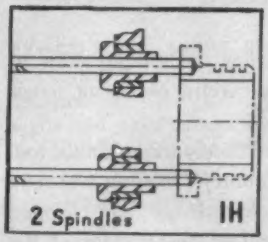
Stainless Steel Nozzle Body
21 operations per minute

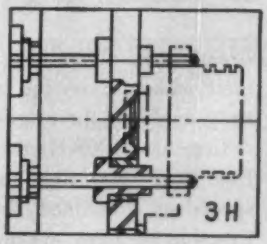
This Kingsbury holds three points of interest for you. 1. It drills stainless steel at 66 FPM. 2. It finish-reams two holes to ±.0005 on diameters. 3. It averages 1,274 operations per hour, producing 182 pieces gross.

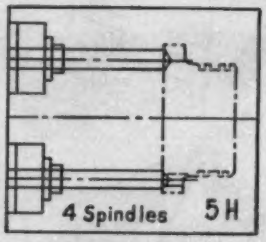
The machine has an 80-inch base with seven horizontal work units, all radial. The 24-inch index table has eight work fixtures, one for loading and unloading, and indexes clock-wise through 8 stations. Bushings guide all drills and reamers.

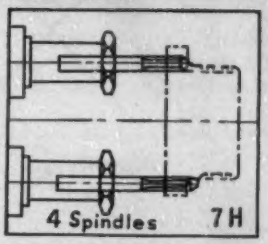


KINGSBURY
AUTOMATIC DRILLING AND TAPPING MACHINES
for Low-Cost High Production









17 operations at an average of one every second!

Second Chucking

Operator removes part and reloads with a new part placed end for end in work fixture as shown in the plan view.

Station 1: Unit 1H with two-spindle head drills two .234 holes ¼ inch deep.

Station 3: Unit 3H with four-spindle head drills four .203 holes through.

Station 5: Unit 5H with four-spindle head c'sinks .312 x 90° the four holes drilled at Unit 3H.

Station 7: Unit 7H with four-spindle head taps the four holes with .250 — 24 Taps.

Parts for both chuckings are loaded and unloaded at eighth position during machining cycle. Bushings guide all drills.

Each Unit Cost on the drawings
includes the cost of the man and of the machine — no power or overhead. We assumed:
Unit cost of man equal to:

$$\frac{\text{average U. S. hourly wage}}{\text{hourly gross} \times 80\% \text{ efficiency}}$$

Unit cost of machine to be:

$$\frac{\text{price of tooled machine}}{\text{output in 6000 hrs. @ 80\% efficiency}}$$

copied but not duplicated

...and REX is the original high speed steel by which all others are judged

Great works of art clearly show the unique skills of their maker. Even the most careful copy can never truly duplicate the original.

Crucible REX® High Speed Steels are *originals*, too. Ever since 1900, when the Country's leading tool steel specialists combined their knowledge and formed Crucible, we have lavished on tool steel making all the skill and care that goes into any work of art.

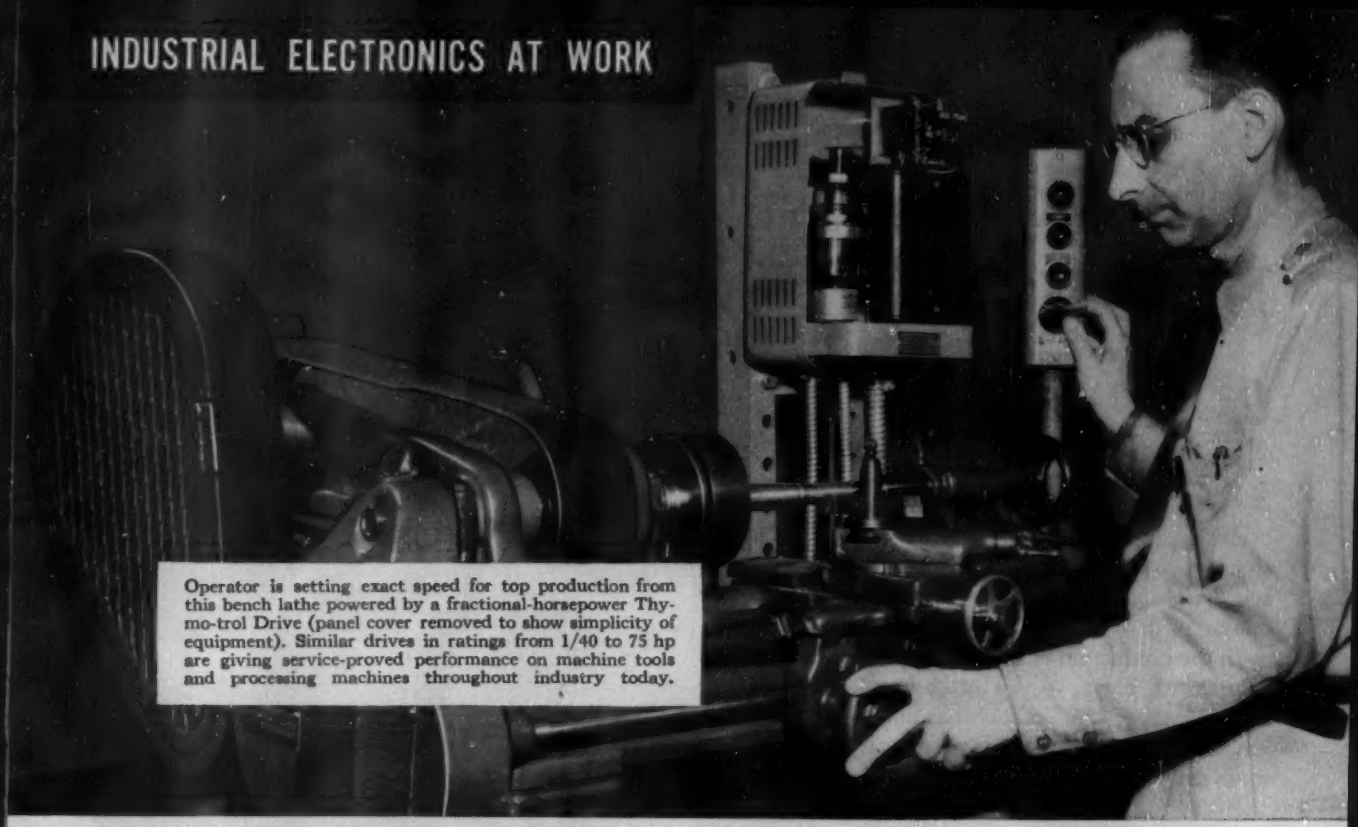
That's why REX is the standard of comparison wherever high speed steels are used. But see for yourself. Put REX to work in your shop . . . check its hardenability, response to heat treatment, general quality and fine tool performance. We feel sure that, like thousands of others, you'll come back for more.

CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking **TOOL STEELS**

CRUCIBLE STEEL COMPANY OF AMERICA · TOOL STEEL SALES · SYRACUSE, N. Y.

INDUSTRIAL ELECTRONICS AT WORK



Operator is setting exact speed for top production from this bench lathe powered by a fractional-horsepower Thy-mo-trol Drive (panel cover removed to show simplicity of equipment). Similar drives in ratings from 1/40 to 75 hp are giving service-proved performance on machine tools and processing machines throughout industry today.

When close speed regulation is required . . .

General Electric THY-MO-TROL* Drives Can Help You Cut Production Costs

EXACTLY THE RIGHT SPEED FOR TOP PRODUCTION is assured by the *wider speed ranges* offered by G-E Thy-mo-trol Drives . . . your machines are more versatile and more productive for a greater variety of jobs. Typical Thy-mo-trol Drive speed ranges are 5:1, 20:1, 50:1 and 100:1; and, if required, much higher speed ranges are possible under certain conditions.

IMPROVED PRODUCT QUALITY AND LESS SPOILAGE are made possible by the *infinite number of speed steps* and *closer speed regulation* provided by G-E Thy-mo-trol Drives. You get and hold the exact speed required for every job and maintain proper speed throughout your entire operating cycle.

GREATER PROTECTION FOR DRIVE AND MACHINE is yours with all full-wave G-E Thy-mo-trol Drives because current limiting features eliminate the danger of overloading machine or drive. If the driven machine should jam, the motor will automatically stall before torque becomes excessive.

*Reg. Trademark of the General Electric Co.

FOR COMPLETE INFORMATION on these and the many other features of G-E Thy-mo-trol Drives contact your nearest G-E Apparatus Sales Office or send in the coupon shown below.

General Electric Company, Section E790-1
Schenectady 5, New York

- ☐ GEA5337, Thy-mo-trol Adjustable-speed Drives. Up to 30 hp.
- ☐ GEA5827, Precision Controlled Thy-mo-trol Drive. ¾ to 10 hp.
- ☐ GEA5829, Simplified Thy-mo-trol Drive. ¾ to 3 hp.
- ☐ GEA5179, Half-wave Thy-mo-trol Drive. Up to ½ hp.
- ☐ GEC-703, Full-wave Thy-mo-trol Drive. ¼ to ½ hp.

Please send me the bulletins checked

- ☐ for reference only
- ☐ for planning an immediate project

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COMPANY_____

ADDRESS_____

CITY_____ STATE_____

GENERAL ELECTRIC

Why stop AUTOMATION at Assembly?

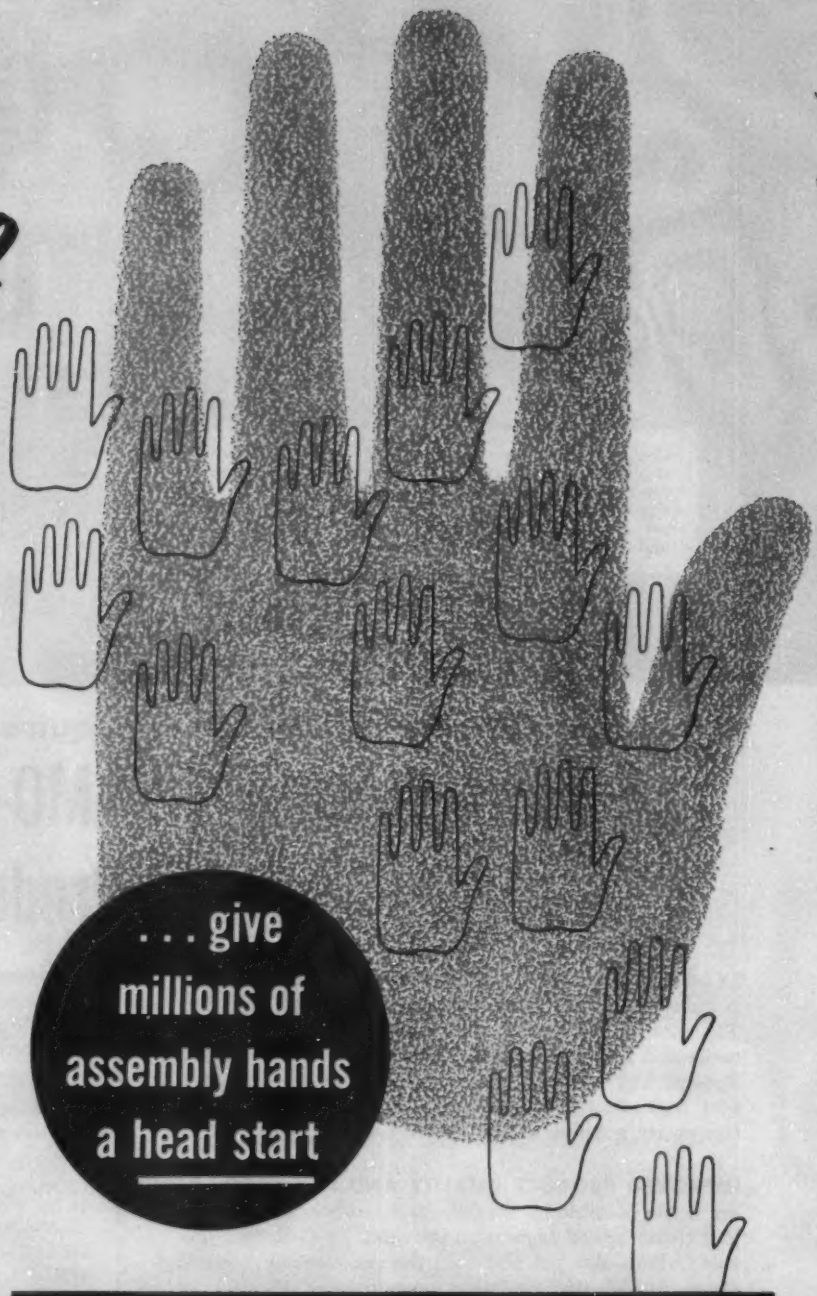
Automation is a new name for an objective long pursued by industry's keenest minds. It means successive elimination of manual operations.

In the production of metal or plastic component parts — by machining, molding, etc. — automation has made advances that in some cases seem almost magical.

By contrast, *assembly* often plods along slowed by outdated methods.

Progress toward automation *does not* end where assembly begins for manufacturers who take full advantage of the P-K Fastening Method. They *eliminate* manual operations like tapping, nut-running, inserts in plastic — and avoid the attendant trouble and expense. Automatic screw driving equipment can be used to further mechanize hand operations on many applications. Savings run up to 50% and more.

Complete automation is, for most, a *distant* dream. Meanwhile, assembly *hands* control your fastening costs. Find out how P-K Self-tapping Screws can *double — even triple* — their efficiency. It *pays* — and pays well — *today*. Talk to a P-K Assembly Engineer. Parker-Kalon Division, General American Transportation Corporation, 200 Varick St., New York 14.



PARKER-KALON

IN STOCK . . . see your nearby P-K Distributor . . .

AUTOMATIC DRIVING adds *extra* speed to the faster P-K Fastening Method. Here, an automatic, double-spindle, hopper-fed machine is being used for driving two P-K Type U Drive Screws simultaneously in a plastic electric outlet. Single or multiple spindle machines are available from several manufacturers.

MAYTAG ASSEMBLY MOVES FASTER because fastenings made with P-K Self-tapping Screws are simpler, easier, dependably secure. In the Maytag Dryer shown, 80 Type A and 46 Hex Head Type Z are used, in all, for fastening sheets from 24 to 11 gage — driven with air-operated tools.

with P-K quality—planned assembly savings pay off

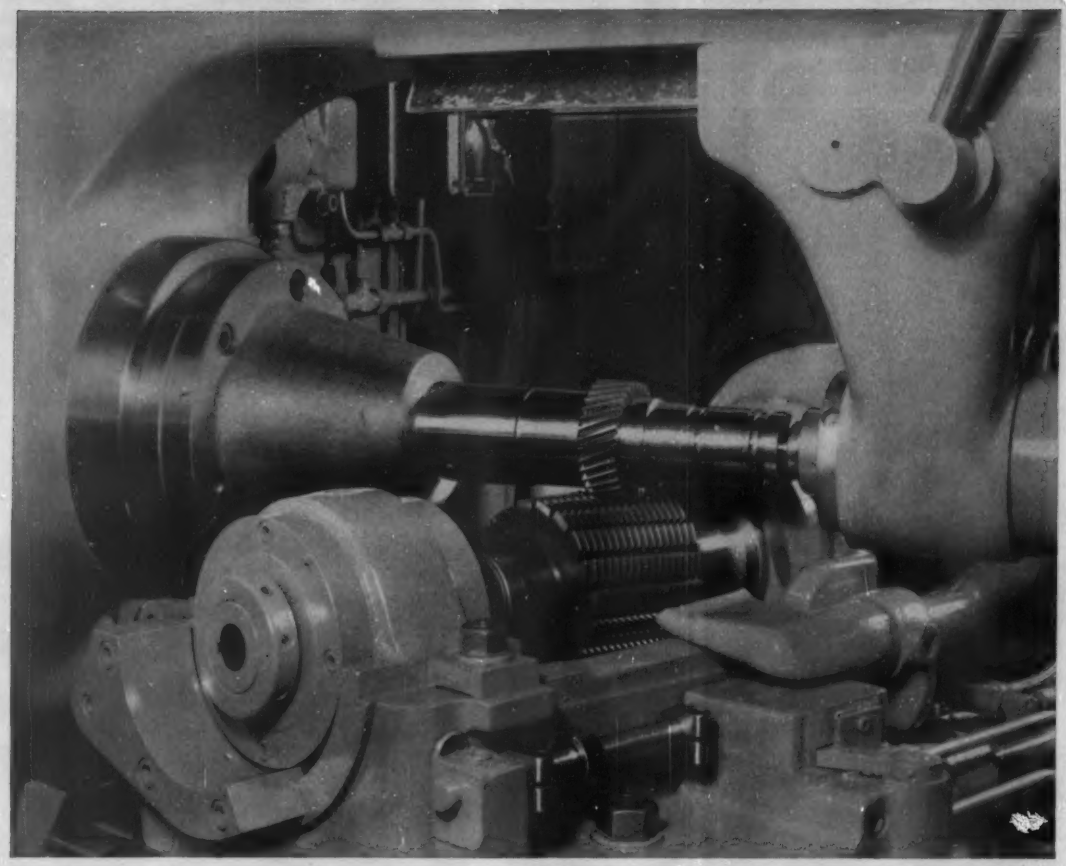
EVINRUDE RELIES ON PROVED STRENGTH of P-K Self-tapping Screws for this critical fastening in an outboard motor sub-assembly, where lasting security is vital. A P-K Binding Head Type F is driven through a die-cast aluminum drive housing and acts as a retainer for the stamped aluminum exhaust baffle.

TELEREX GETS CLEAR PICTURE of performance. For this "Hi-V" Reflector, Telerex, Inc., needed proved resistance to high tension and vibration. They specified 17 slotted Hex Head Z, reasoning soundly that P-K, the *originator*, knows best how to put uniform hardness and toughness in *every* screw.

The Original

SELF-TAPPING SCREWS

your local Supply and Service Specialist



HIGH-SPEED HOBBING

INCREASES PRODUCTION AND TOOL LIFE

The Barber-Colman No. 14-15 Hydraulic Hobbing Machine is being used in several plants for hobbing of steel gears at speeds of approximately 300 SFM with an increase in both production and tool life. Although these speeds have not been considered practical until recently, the size, power and rigidity of the No. 14-15 Machine make it ideal for high-speed hobbing. Even with a standard hob slide, speeds of 300 SFM with a 5″ hob are possible. However, most machines for high-speed hobbing are equipped with a special heavy-duty, high-speed hob swivel.

The high-speed hob swivel is capable of speeds up to 950 RPM and is designed to accommodate hobs up to 7″ diameter. The extra size and weight of this swivel provide the rigidity to maintain accuracy at high speeds. It is equipped with super-precision ball or tapered roller bearings. An automatic hob shifter may be furnished as extra equipment. High-speed hob swivels may be installed on recent machines in the field.

BUILDERS OF PRECISION GEAR

The jobs shown here indicate at least 200% increase in production, 100% better tool life, greater profile accuracy and equal or improved surface finish on the hobbed gears, hobbing at speeds of 300 SFM or greater. Using ground and unground hobs, gears were cut from a wide range of steels as high as 207 Br. hardness.

FIRST SERIES OF TESTS

		STANDARD HOB WITH		[illegible] HOBS		% INCREASE	
DP	No. Teeth	Cutting Time at 135 SFM	Pieces Per Shift	Cutting Time at 326 SFM	Pieces Per Shift	Prod.	Tool Life
6	36 Spur	10.64 min.	72	4.2 min.	161	253%	223%
6	35 Spur	11.62 min.	72	4.5 min.	151	258%	209%
8	55 Helical	15.14 min.	50	6.94 min.	105	218%	210%
8	62 Helical	26.8 min.	28	10.3 min.	72	260%	257%

Double Thread Hob, 5x5x2
Steel — AISI 8620 normalized
Feed — .060"/rev.
No difference in surface quality
Profile and lead angle above average accuracy

SECOND SERIES OF TESTS

		[illegible]	[illegible]
Accurate Unground 9 D.P. 3-Thd. 5x5x2	22 Teeth, Helical SAE 5135 170-207 BHN	307 SFM	.045"/rev.
Same	Same	307 SFM	.070"/rev.

Climb Hobbing
Material — AISI 5135
Average lead error—at .070" feed within .0006" in 13/16"
Total Composite Error—.002" both feeds
Estimated Hob Life—200 per sharpening
Using same speed and feeds with conventional hobbing, resulting finish was not as good.

Although high-speed hobbing of steel gears is not used extensively as yet, it is used on enough jobs to prove that it is applicable under the proper conditions. Tests indicate that tool life increases until a speed of 200 SFM is reached, and then drops off rapidly to a speed of 250 SFM. After 250 SFM, however, hob life increases again until it is equivalent or better at 300 SFM than at 200 SFM. Materials on which satisfactory results have been produced include AISI 1113, 8620, 5135 and 4140.

Our Engineers have been working with our customers on high-speed hobbing and have helped to solve many problems. They will be glad to discuss the economy of high-speed hobbing to your specific job if you will submit your part print and production requirements to them.

Call your Barber-Colman representative or write direct to:

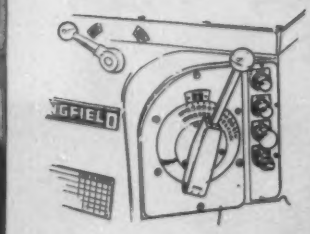
HOBS • CUTTERS • REAMERS
HOBBING MACHINES
HOB SHARPENING MACHINES

BARBER COLMAN

Barber-Colman Company

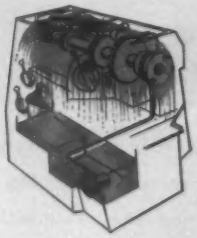
GENERAL OFFICES AND PLANT, 815 ROCK STREET, ROCKFORD, ILLINOIS

HOBS AND MACHINES SINCE 1911



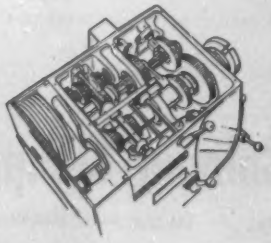
it does more work (and the operator does less)

Simple, least-effort controls: color-coded dial selection of 24 spindle speeds; four levers for totally enclosed gear box; tailstock wheel set at angle for easiest operation; wheel has two speeds, one for normal operation, one for drilling; chip pan on casters for quick movement to insure cleaner, safer floors.



it runs cooler

Continuous oil-mist lubrication of all headstock gears does more than lubricate; it carries heat away into large sump in headstock leg. Cooler head minimizes distortion during warmup; markedly improves accuracy and stability of work alignment.



it saves power, cuts wear

The headstock has only four gears in mesh at once for any speed. Other gears run free; flywheel action adds to stability. No "pass-through" gears in shifting.

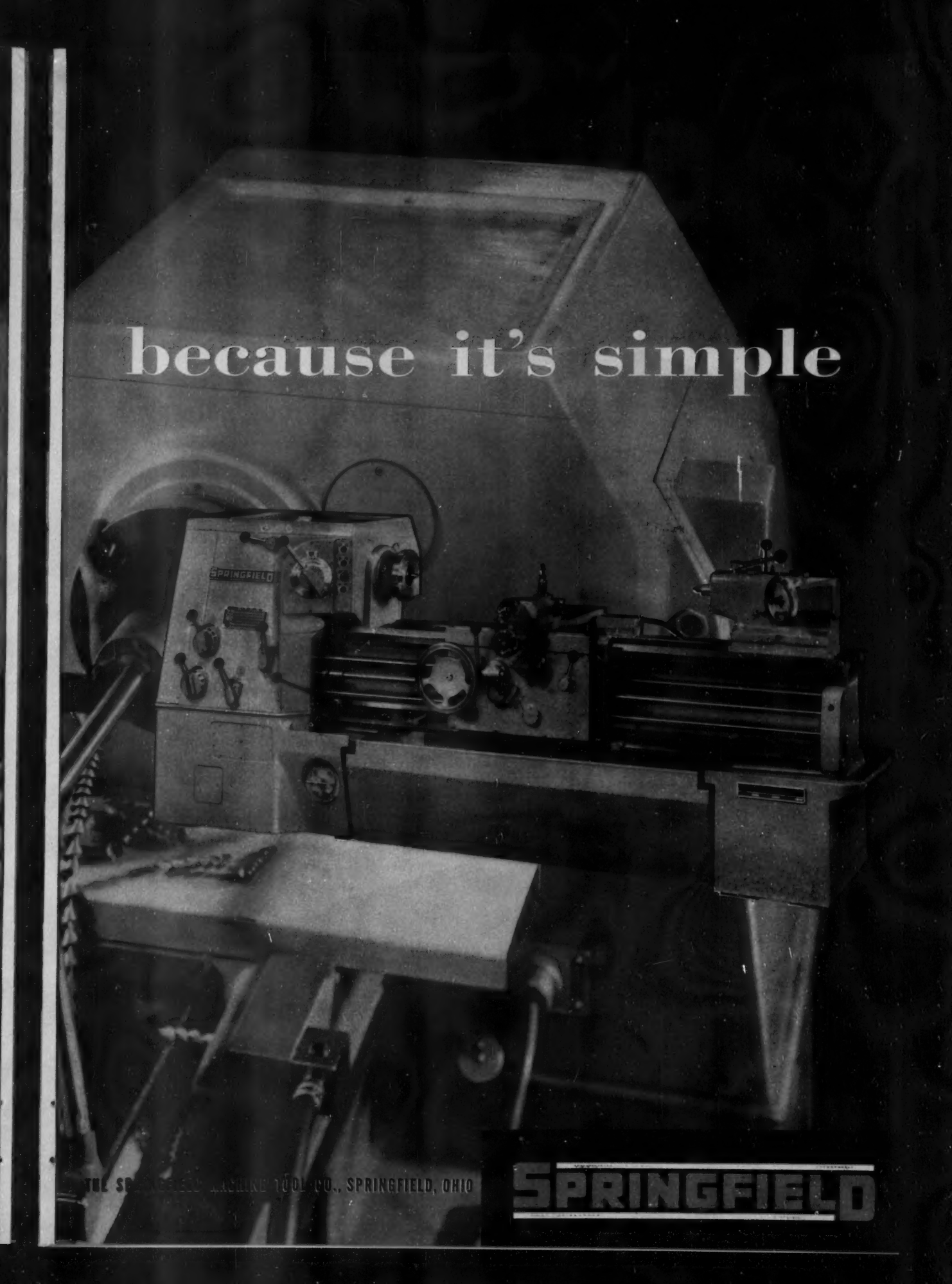
it promotes cleanliness—and safety

Clean modern design encourages good shop practices, better maintenance; builds pride in workmanship and better quality in work produced.

Engine and toolroom lathes: swings 14" to 32"
Contouring and reproducing lathes: swings 14" to 32"
Universal vertical grinders: swings 21" to 52"

write for name of your nearest dealer

67TH YEAR OF BUILDING IDEAS INTO MACHINE TOOLS


because it's simple
SPRINGFIELD
THE SPRINGFIELD MACHINE TOOL CO., SPRINGFIELD, OHIO
SPRINGFIELD

ARMSTRONG

Use the Correct...

ARMSTRONG TOOL HOLDERS

to increase pieces, production and profits!

Because they do their work so well, without repairs, maintenance or replacement . . . because they last for years and have become as much a part of everyday operations as steel itself, the importance of using the correct type and size ARMSTRONG TOOL HOLDER for each operation, is frequently overlooked. It should always be remembered that by controlling the cutting point, ARMSTRONG TOOLS control both the productivity and efficiency of every lathe, planer, slotter, and shaper in most shops.

Tools so vitally situated, no matter how trouble-free, deserve periodic checking . . . checking to see that the correct size and correct type ARMSTRONG TOOL HOLDER is being used for each operation: checking to be sure that you are taking full advantage of the newer additions to the Armstrong System—the special types for ARMIDE (Carbide Tipped) Cutters, others for ARMOLOY (Cast Alloy) Bits and Blades; the newer "spring" form threading tools and cutting-off, etc., etc.

Write for a recent ARMSTRONG Catalog and check your tooling of each operation.

ARMSTRONG BROS. TOOL CO.

"THE TOOL HOLDER PEOPLE"

5215 W. ARMSTRONG AVE. CHICAGO 30, ILL.

For HYDRAULIC presses, too . . . it pays to specify BLISS

New BLISS HYDRO-DYNAMIC PRESS

helps Ford form 1000 different wing parts

Four die slides and a choice of any pressure up to 5000 tons give short run versatility

High pressures and short runs are typical requirements of modern aircraft production. To meet these needs during World War II, Bliss developed special rubber pad forming presses. Now pressure requirements are higher still. The Ford Motor Company's new Hydro-Dynamic press has *5000 tons capacity*. And it produces over 1000 different wing parts at Ford's Kansas City plant.

Here's how it works: While one die slide is in the press, blanks are set up or dies changed on the other three. Slides can then be fed to the press in any sequence; operators at each of the die slide tables can select any pressure required up to 5000 tons; and, of course, the rubber pad forming techniques keep tooling costs down.

Like this Ford installation, many Hydro-Dynamic presses are engineered for special-purpose use. But also available are standard Hydro-Dynamic presses designed to meet the more common production problems. Both types are described in Catalog 30-A which is yours for the asking.

Simply write or wire address below.

RUBBER PAD FORMING *of small aircraft parts, in comparatively short runs, has reduced tooling expenses, cut preproduction time and is generally less costly than conventional drop hammer methods. Bliss press engineers helped pioneer the development during World War II.*

BLISS on your press is more than a name... it's a *guarantee*

E. W. BLISS COMPANY, Canton, Ohio

PRESSES, ROLLING MILLS, SPECIAL MACHINERY

E. W. Bliss (England) Ltd., Derby, England • E. W. Bliss Company (Paris), St. Ouen sur Seine, France

U. S. Plants in Canton, Salem and Toledo, Ohio; and Hastings, Michigan. *Branch Offices* in Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Philadelphia, Rochester, Toledo; and Toronto, Canada. *West Coast Representatives:* Moore Machinery Co., Los Angeles and San Francisco; Star Machinery Company, Seattle. *Other representatives throughout the world.*

Monarch

Replaces a planer equipped with grinder head attachment

This Giant Thompson Grinder is one of nine working for The Monarch Machine Tool Company.

Through the years in increasing efficiency of their very fine lathes and in step with modern methods, Monarch has relied on the utility and precision of Thompson Grinders. Thompson is proud of this record of service and especially its ability to provide extreme precision grinding on this largest of all surface grinders.

INSTALLS WORLD'S LARGEST...

Surface Grinder

precision grinding lathe bedways up to 32 ft. long to a tolerance of five ten-thousandths of an inch .0005"

The precision of Thompson Way Grinders is exemplified in this giant new machine recently installed in the plant of the Monarch Machine Tool Company of Sidney, Ohio. Monarch lathes are known the world over for their extreme efficiency and accuracy, therefore, in the machining of the bedways of their longest machines they had to depend on grinding equipment that maintained exceptional accuracy over entire surfaces up to 32 feet in length. This accuracy is perfectly maintained on this Thompson Way Grinder to five ten-thousands of an inch.

Thus, this surface grinder is not only the World's largest but size for size, one of the World's most accurate machines. The overall length is 79 feet and it measures 13 feet high and 13½ feet wide. Yet in spite of its size all operations are easily controlled by a single operator automatically from the convenient suspended push button control panel. This is typical of Thompson centralized control available with all types and sizes of Thompson Grinders. It will pay you to consult Thompson Engineers in finding an economical solution to *your* problems.

Have Thompson Engineers solve your grinding problems

THE THOMPSON GRINDER COMPANY
Springfield, Ohio

Thompson Grinders

...but AMERICAN showed me how to save on STAINLESS FASTENINGS"

"I thought I knew exactly what I needed in Stainless Steel Screws . . . and then I learned the *smart* way to buy. The folks at American showed me how to choose among the several types of Stainless on the basis of 3 factors: *Hardness, Corrosion-resistance, and Economy.* And sure enough, they came up with a better fastener for my job than the one I thought I wanted . . . at a cost that was less than I expected."

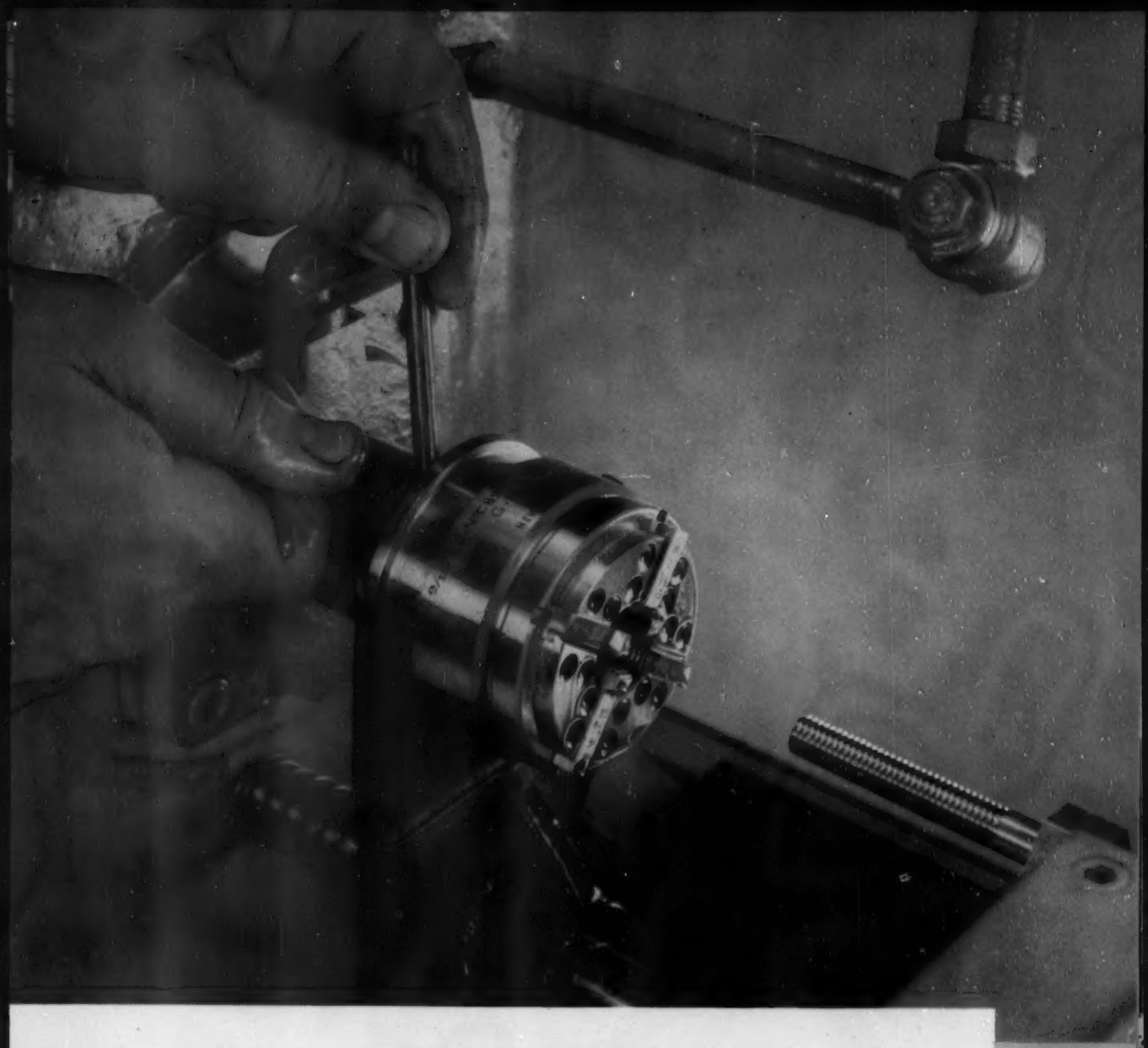
This experience is not unusual . . . *it can be yours, just as well.* Why not let American's experience and "stainless reputation" help solve your problem, too? Write or wire today.

SINCE 1930

AMERICAN SCREW COMPANY

PHILLIPS HEADquarters
WILLIMANTIC, CONNECTICUT

Main Office & Plant
Willimantic, Conn.
Office & Plant, Norristown, Pa.
Office & Warehouse, Chicago, Ill.
Office, Detroit, Michigan



QUICK ADJUSTMENT..ON THE MACHINE!

For high-speed service on live spindle machines, the KD Rotary Self-Opening GEOMETRIC Die Head is compact, accurate, well balanced . . . made for long, trouble-free life. Chasers are adjusted merely by loosening a Binding Screw and turning Adjusting Ring for desired size. No need to take the head off the machine, even to change the chasers.

Available in seven sizes for #0 to 2½" diameter threads. Hollow shanks allow threading to any length. A positive-opening flange trip provides for repeat threading to identical lengths.

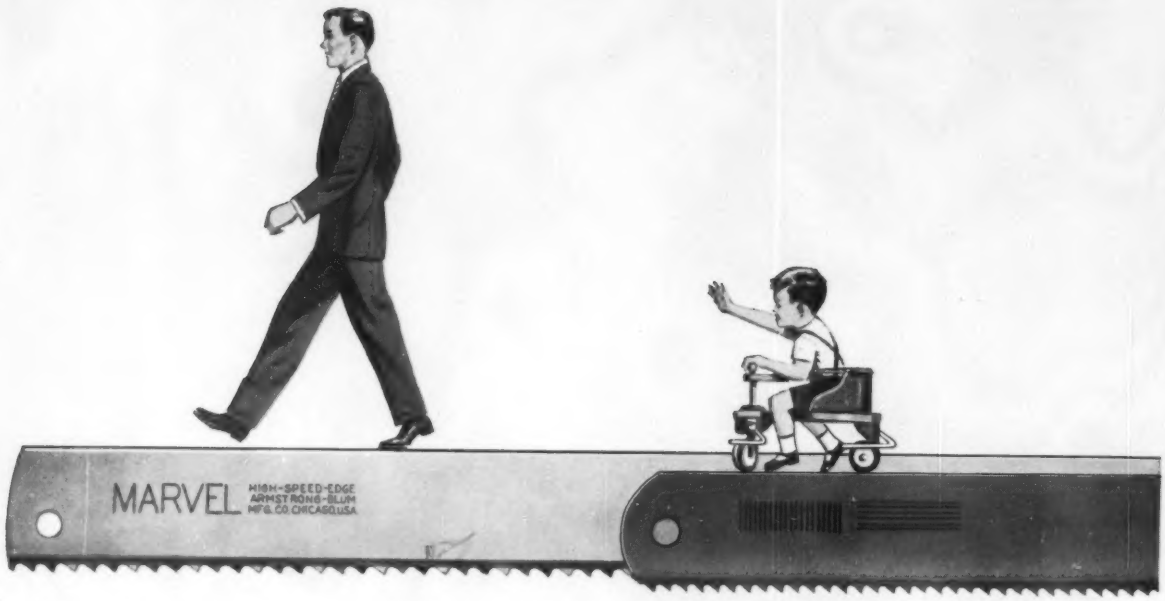
Write for full details. Specify Bulletin KD

Greenfield Tap and Die Corporation

GEOMETRIC TOOL COMPANY DIVISION

NEW HAVEN 15, CONNECTICUT

GEO MET RIC



. . . *but*
Experience Cannot be Copied

More than a quarter-century ago MARVEL invented and basically patented the MARVEL High-Speed-Edge Hack Saw Blade—the UNBREAKABLE blade that increased hack sawing efficiency many-fold.

Every MARVEL Hack Saw Blade ever sold has been of that basic welded high-speed-edge construction, with constant improvements from year to year, as EXPERIENCE augmented the "know-how" . . .

MARVEL is not "tied" to any single source of steel supply, and has always used the best high speed steels that became available from time to time as metallurgy progressed. When-as-and-if finer steels are developed—and are proven commercially practical for welded-edge hack saw blades—MARVEL will use them, regardless of cost or source . . .

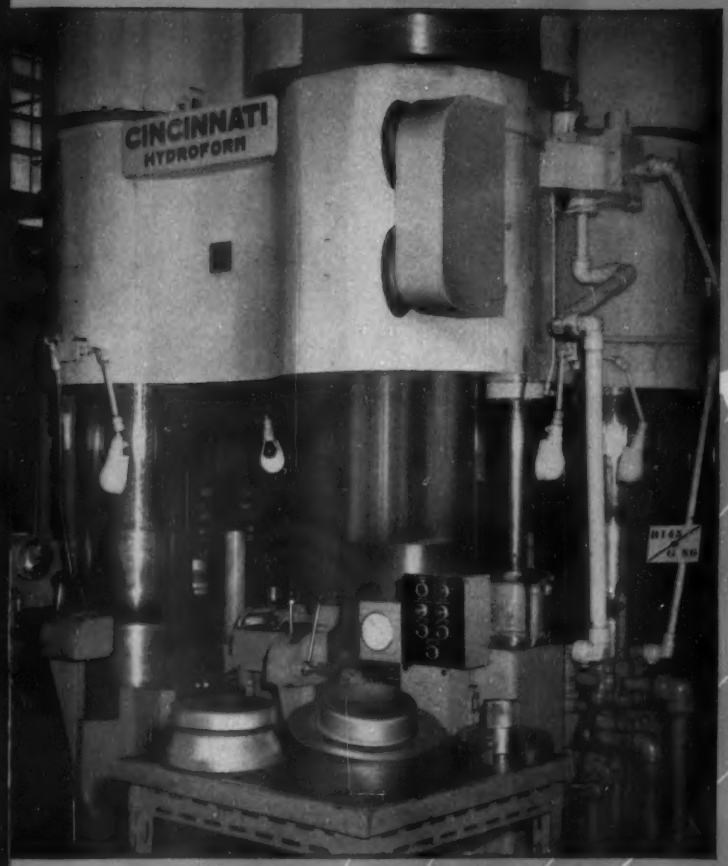
There is only one genuine MARVEL High-Speed-Edge! All other "composite" or "welded-edge" hack saw blades are merely flattering attempts to imitate — without the "know-how" of MARVEL EXPERIENCE . . .

Insist upon *genuine* MARVEL High-Speed-Edge when buying hack saw blades—and be SAFE, for you can depend upon MARVEL. They have been "tested", "pre-tested", and "re-tested" by thousands of users for more than a quarter-century!

MARVEL *Metal Cutting* SAWS

Better Machines–Better Blades

ARMSTRONG-BLUM MFG. CO. • 5700 Bloomingdale Ave. • Chicago 39, U. S. A.



Cockshutt Aircraft Ltd. produces improved jet engine parts at lower costs by Hydroforming

COMPLEX REENTRANT-SHAPED JET ENGINE PART is produced on the Cincinnati 26″ Hydroform in two operations. See Figs. 1 and 2 below.

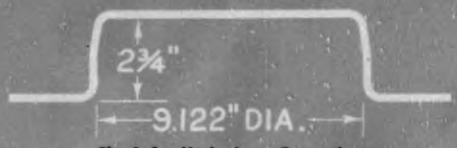


Fig. 1: 1st Hydroform Operation

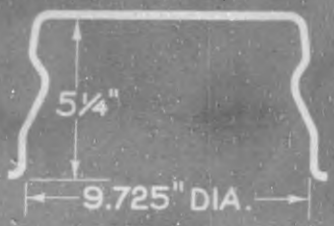


Fig. 2: 2nd Hydroform Operation

A 17¼″ dia. blank of 0.064″ Nimonic 75 is first drawn to shape shown in Fig. 1. The punch consists of two principal elements: a segmented top and a solid base for forming the shape as shown in Fig. 2. The top, segmented section of the punch is shown at right on the table in the photograph above. Completed part and 1st operation shell are also shown. An annealing operation is used between the 1st and 2nd draws to reduce the grain size. To achieve additional clarity of outline at the neck section, the part is rolled after trimming.

A leading supplier of jet engine parts, Cockshutt Aircraft Ltd., Renfrew, Ontario, Canada, is obtaining many production economies by *Hydroforming* a variety of engine components that would be costly or difficult to produce by conventional methods. Two Cincinnati Hydroforms of 12″ and 26″ capacities are employed. The part shown in the photograph above and in Figs. 1 and 2 is typical of the work produced by Hydroforming.

Frequently Cockshutt finds it advantageous to combine Hydroforming and mechanical pressing to produce a drawn part. They report the following benefits are obtained from total Hydroforming and from combined Hydroforming-mechanical press drawing:

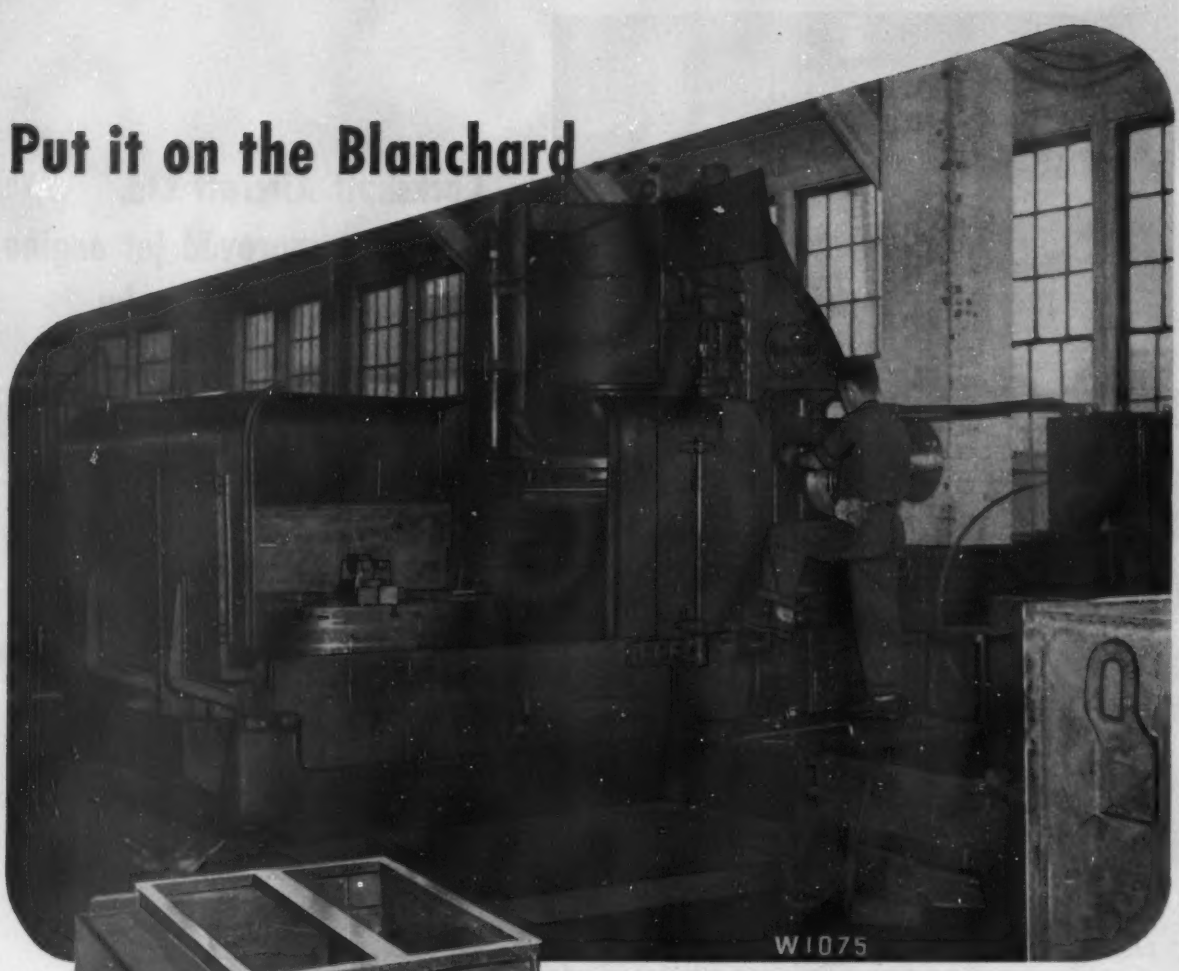
- Greatly reduced tool costs.
- Parts are produced free from wrinkles, deformation and excessive scratching.
- Part quality is improved as there is a minimum of wall and nose thin-out. The metal is displaced rather than stretched into shape.

Hydroforming offers many time- and cost-saving advantages—particularly for development work and for short runs. Let a Cincinnati Milling field engineer give you complete details. For a description of the Hydroforming process and specifications of the 8″, 12″, 19″, 23″, 26″ and 32″ machine sizes, write for Bulletin M-1759-3.

CINCINNATI Hydroform

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO, U. S. A.

Put it on the Blanchard



it takes 1/5th the time!

Here is another example of the special jobs Blanchard Surface Grinders perform *in less time,* to exacting specifications.

These explosion-proof control cases are used in the coal mining industry. Each steel weldment case is 36" x 48" x 24" deep. Because gaskets cannot be used, surface finish, and flatness must provide a dust and gas explosion-proof metal seal.

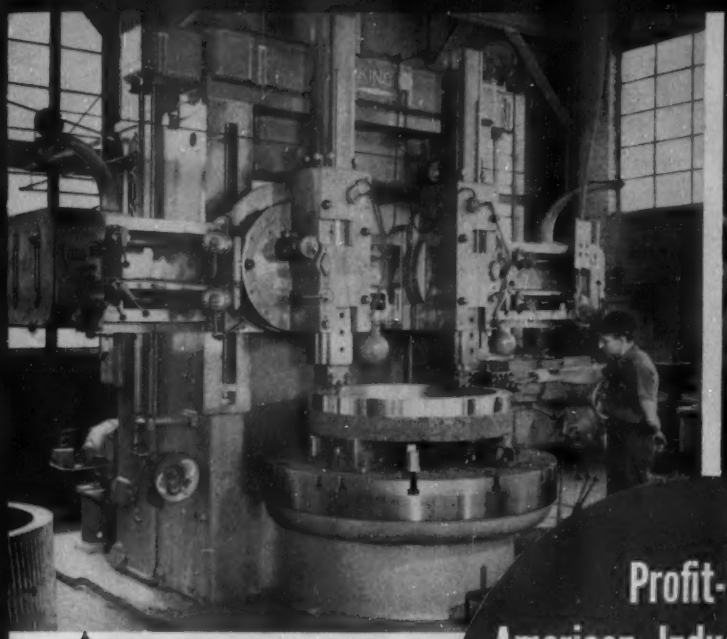
A Blanchard Surface Grinder, the No. 32-60, removes approximately 1/8" of stock — in *one-fifth* the machining time formerly required.

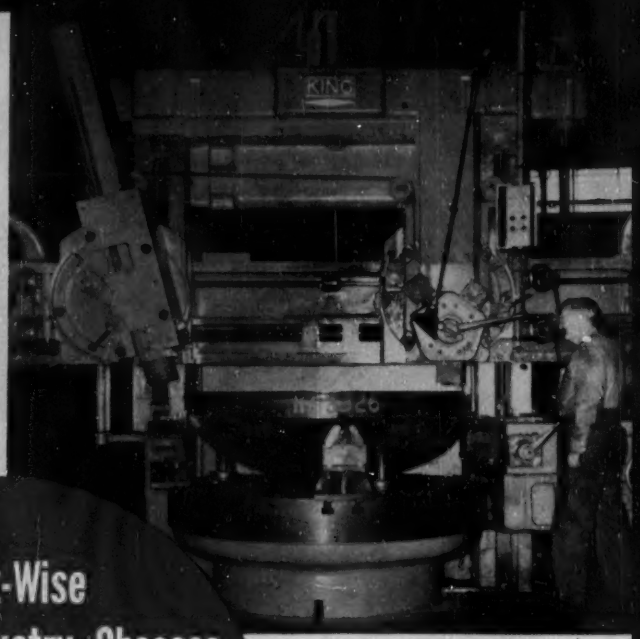
Send a sampling of your parts for free test grinding and our recommendations.

Send for your free copies of "Work Done on the Blanchard", fourth edition, and "Art of Blanchard Surface Grinding".

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY 64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.





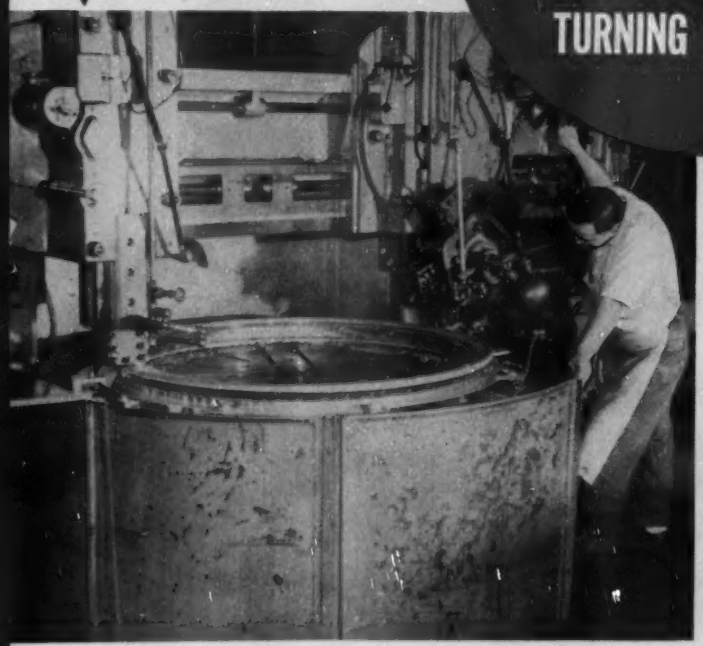
Profit-Wise American Industry Chooses KING VERTICAL BORING & TURNING MACHINES

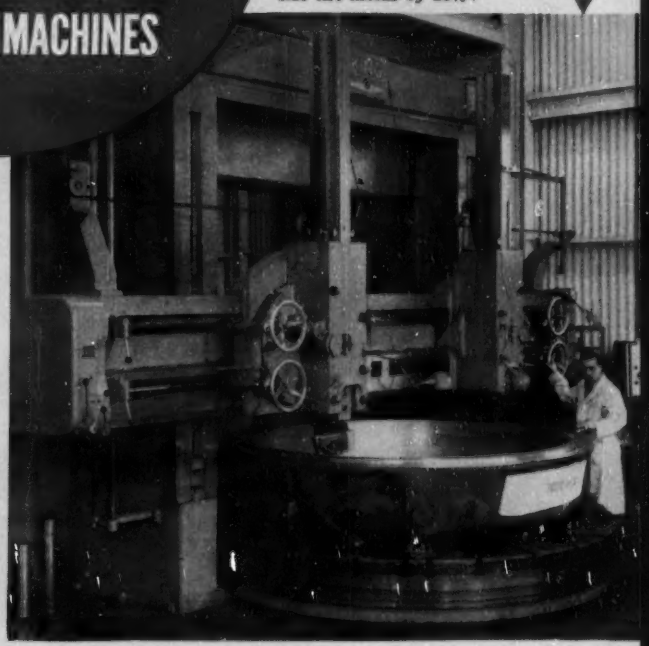
▲ Operator of 72″ KING at The Tool Steel Gear & Pinion Co., Cincinnati, says "It's the most solid, smoothest-running machine I've ever operated!"

72″ KING at Combustion Engineering-Superheater, Inc., Chattanooga, "produces more work than the former output of two other mills combined." ▲

72″ KING at the Kaydon Engineering Corp., Muskegon, Michigan, "consistently produces large diameter, thin section bearing rings with a maximum eccentricity of .001″. ▼

120″ KING at The Akron Standard Mold Co., Akron, "turns out work even faster than we anticipated . . . has increased production on large size tire molds by 25%." ▼



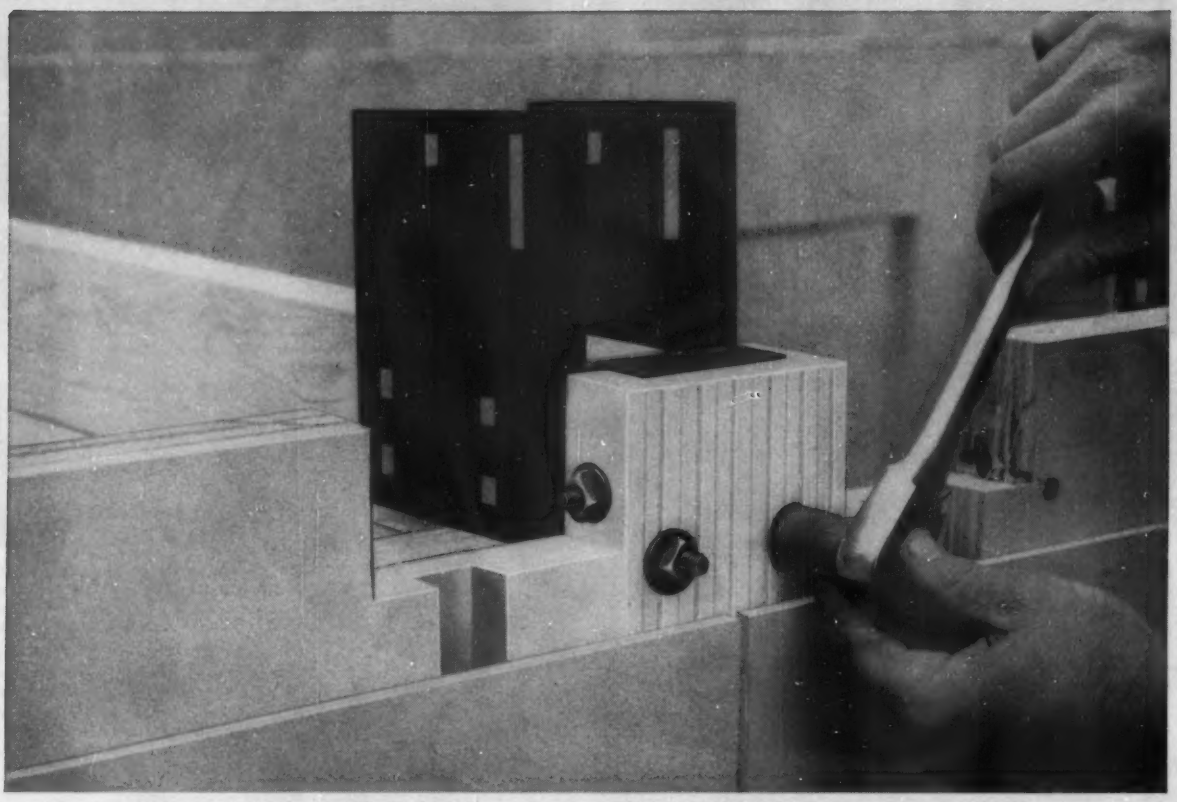


Massive proportions and extra-heavy construction give all KING machines the rigidity essential for fast work with consistent precision accuracy. A wide range of speeds and feeds, plus simplified controls, make the KING adaptable for all types of boring, turning, and facing work—light or heavy, large or small. KING machines are made in ten sizes—30″, 36″, 42″, 52″, 62″, 72″, 84″, 100″, 120″, and 144″—and in a variety of head combinations, with or without side head. Complete details will be furnished promptly on request. Contact your authorized KING distributor, or write to us direct.

AMERICAN STEEL FOUNDRIES

KING MACHINE TOOL DIVISION

Vertical boring & turning machines . . . 1150 TENNESSEE AVE., CINCINNATI 29, OHIO



RAISING THE ROOF of a U.S. Steel home goes faster with help of RB&W bolts. Here workman is tightening bolt holding steel plate to exterior wall panel. Plate is then used as joint for bolting ceiling panels.

That's a house he's bolting together!

U.S. Steel Homes found that bolting together the panels of their fast-selling homes saves time and trouble. Nails are used only to hold panels temporarily in position for bolting and add no structural strength.

It's no accident, of course, that RB&W bolts and nuts were specified here. U.S. Steel Homes isn't the first to discover that the absolute uniformity and dependable holding power of RB&W products make them the best fasteners for any job. Workmen like the way RB&W nuts run on RB&W bolts fast and easy. And there's no question about the extra strength RB&W bolt-and-nut construction gives these homes.

Whenever you want to put something together *fast*, and make it stay fastened *for good*, give one of our men a ring. As a top-ranking maker of all kinds of fasteners, we're always able to recommend and supply the right ones for all your needs. You can count on fast delivery, too. RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY, Port Chester, N.Y.

HOUSE GOING UP. U.S. Steel home nears completion as workmen on scaffold (right) bolt on exterior panels. These sturdy homes offer quality construction at budget price.

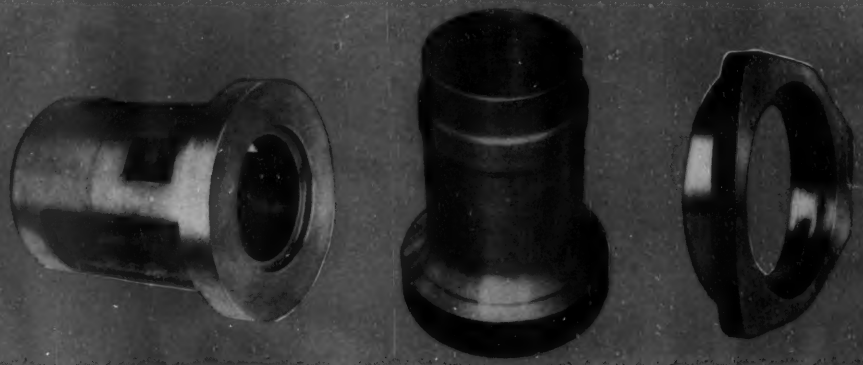
3.8

RB&W

109 YEARS MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG

Plants at: PORT CHESTER, N.Y.; CORAOPOLIS, PA.; ROCK FALLS, ILL.; LOS ANGELES, CALIF. *Additional sales offices at:* ARDMORE (PHILA.), PA.; PITTSBURGH; DETROIT; CHICAGO; DALLAS; SAN FRANCISCO. *Sales agents at:* PORTLAND, SEATTLE. *Distributors from coast to coast.*

big production jumps such as these actual jobs...



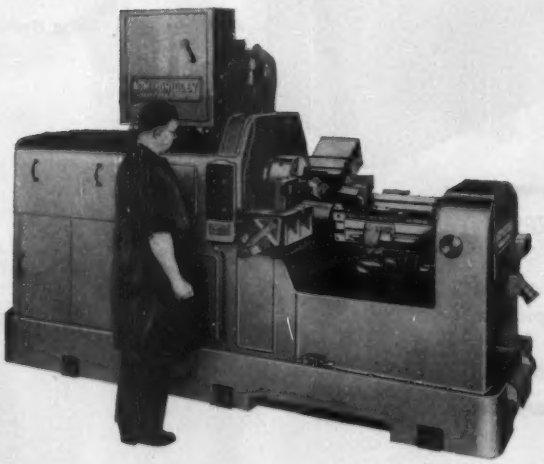
	FINGER HOLDER BODY 6⅝" dia. Semi-steel	SEMI-FINISHED COLLET 5⅞" dia. 4160 steel	BEARING RETAINER 9¼" dia. Lumen alloy
Former Method	39. 2 minutes	65 minutes	17.3 minutes
Model MC Time	11.2 minutes	13 minutes	6.0 minutes

can be made ONLY on the brand new

12"-UNIVERSAL

MODEL MC ACME-GRIDLEY

Single Spindle Automatic Chuckers



General claims about this or any other new model machine can be facts BUT every experienced shop executive knows that only a comparison of specific net gains of new methods over old can justify his serious investigation.

For this reason we emphasize the unprecedented production gains on 3 chucking jobs, typical of the kind of time savings realized since we announced the new Acme-Gridley 12" Universal Single Spindle Chucker a year ago.

If you believe that similar facts on your particular chucking problems are worth your making such a comparison and if you are willing to be surprised by similar gains, guaranteed, your next move is to call in our engineers. General bulletin MC53 tells all about the design advantages.

You can't do TODAY'S job with YESTERDAY'S tools— and be in business TOMORROW.

The NATIONAL ACME COMPANY

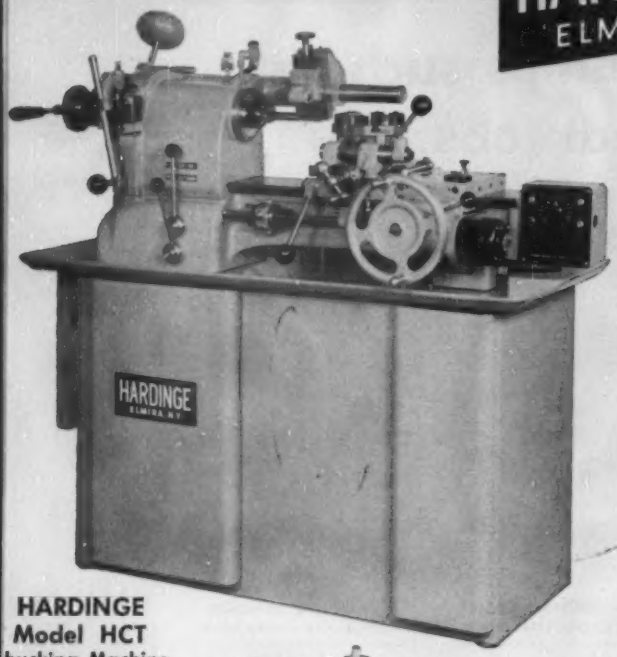
170 EAST 131st STREET • CLEVELAND 8, OHIO

ACME-GRIDLEY BAR and CHUCKING AUTOMATICS
1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids • Contract Manufacturing

Precision PRODUCTION MACHINES

HARDINGE
ELMIRA, N.Y.

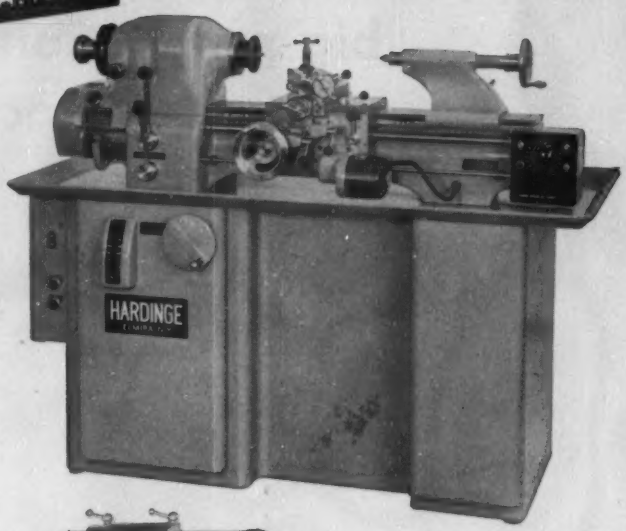
Precision TOOL ROOM MACHINES



HARDINGE
Model HCT
Chucking Machine with Production Threading Head

Also Model HC Chucking Machine without Production Threading Head

HARDINGE
Model DSM 59
Second Operation Machine



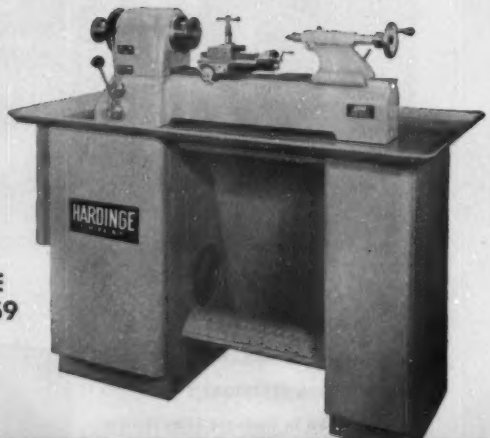
HARDINGE
Model HLV
Tool Room Lathe

HARDINGE
Model UM
Universal Milling Machine
Also
Model TM Plain Milling Machine

ALL MACHINES
Feature
HARDINGE Preloaded Ball Bearing Spindle Construction for High Speeds

HARDINGE
Model VBS
Second Operation Machine with Stationary Collet

HARDINGE
Model DV 59
Lathe



HARDINGE BROTHERS, INC., ELMIRA, N. Y.

OFFICES IN PRINCIPAL CITIES. Export Office: 269 Lafayette St., New York 12, N. Y.

KIEKHAEFER

MERCURY

15th Anniversary Models

G.S. GEARS FOR 15 YEARS

Gearing of *finest* quality has always been demanded by KIEKHAEFER Corporation of Fond du Lac. Extreme accuracy and rigid adherence to critical specifications have applied from the first MERCURY made, to the brilliant 1954 line. Throughout "Fifteen Fabulous Years" G. S. Gears have helped MERCURY gain a position of quality leadership unequalled in the history of the industry!

Big features of the "Mighty Mark 50" pictured here, are new standards of speed, power and performance. 4 cylinders . . 40 horsepower . . *today's most powerful outboard!* To take speed and power like that, successfully, *the Gearing has to be good!*

Congratulations to KIEKHAEFER Corporation on the occasion of their 15th Anniversary. We at G. S. are thankful for the opportunity to serve.

GET OUR *Free* 6-PAGE FOLDER

See where and how we mass-manufacture Small Gearing to uniformly fine tolerances. This attractively printed 8½ x 11" 6-page folder is punched for ring-binder use. You'll want to keep it handy for frequent reference. It contains 23 pictures of Small Gears, plant views, as well as Diametral and Circular Pitch Tables. Ask for your copy on company stationery, please!

FRACTIONAL HORSEPOWER GEARING

GS

GEAR Specialties, Inc.

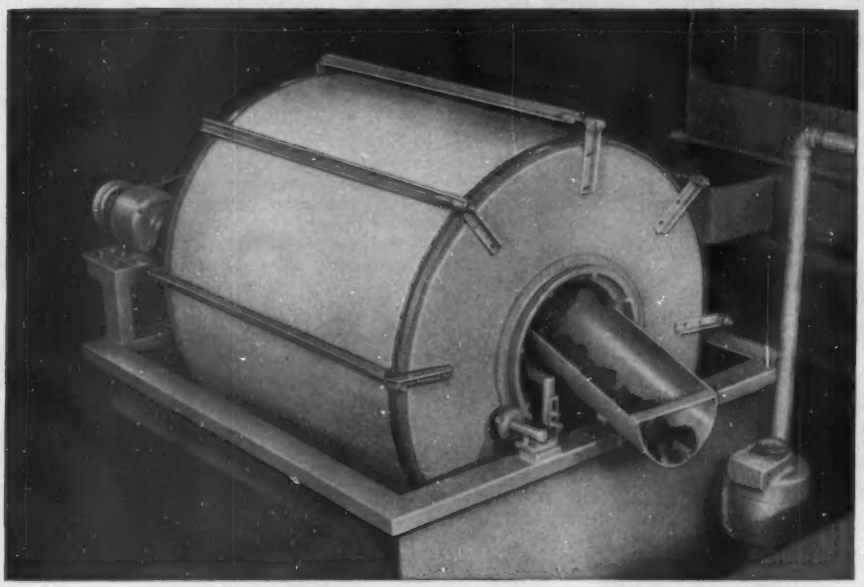
2635 WEST MEDILL AVENUE
CHICAGO 47, ILLINOIS

SPURS • SPIRALS • HELICALS • BEVELS • INTERNALS
WORM GEARING • RACKS • THREAD GRINDING

WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF FRACTIONAL HORSEPOWER GEARING

The MURRAY WAY INDUSTRIAL FILTER

A Revolutionary Development in Solution Reclamation That Gives You These Money-Saving Features!



- **AUTOMATICALLY OPERATED**
- **SELF-CLEANING**
- **ECONOMICAL**
- **COMPACT**
- **ADAPTABLE**

The Murray-Way Industrial Filter automatically rotates fresh filtering area into position while simultaneously ejecting the contaminant.

With this new unit costly consumption of throw-away filtering media is eliminated since the wire filtering screen has many times the life of cloth filtering webs.

The Murray-Way Industrial Filter is a compact unit. It offers unusually great filtering capacity in proportion to area occupied.

Amazingly adaptable, the Murray-Way Filter may be used with an individual machine unit or as a central filtering station for many units. Capacity of filtration may be easily increased by adding filters in tandem—separately or in the same tank, to meet requirements. A selection of filtering screen material and size of screen opening can be supplied in monel, stainless steel, brass or bronze to fit your requirements.

OTHER MURRAY-WAY EQUIPMENT

Micro-Polish Equipment
Polishing and Buffing Conveyors
Automatic Dial Tables
Standard and Special Polishing Heads
Specially Engineered Automation
Automatic Loaders and Unloaders

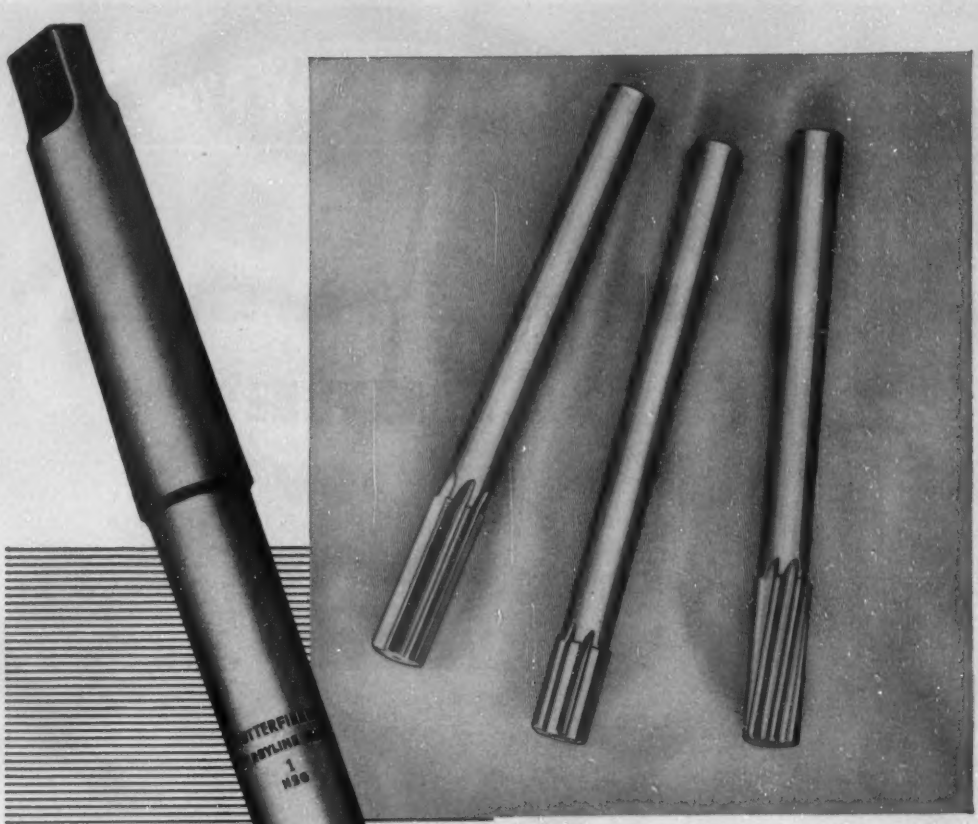
For technical details of operation—write for Bulletin F-5301.

MURRAY WAY

THE MURRAY-WAY CORPORATION

POST OFFICE BOX 180 – BIRMINGHAM, MICHIGAN

AUTOMATIC POLISHING, BUFFING, GRINDING EQUIPMENT



Butterfield's rigid control over quality in every step of its manufacturing process is what gives Butterfield reamers extra performance on your production line.

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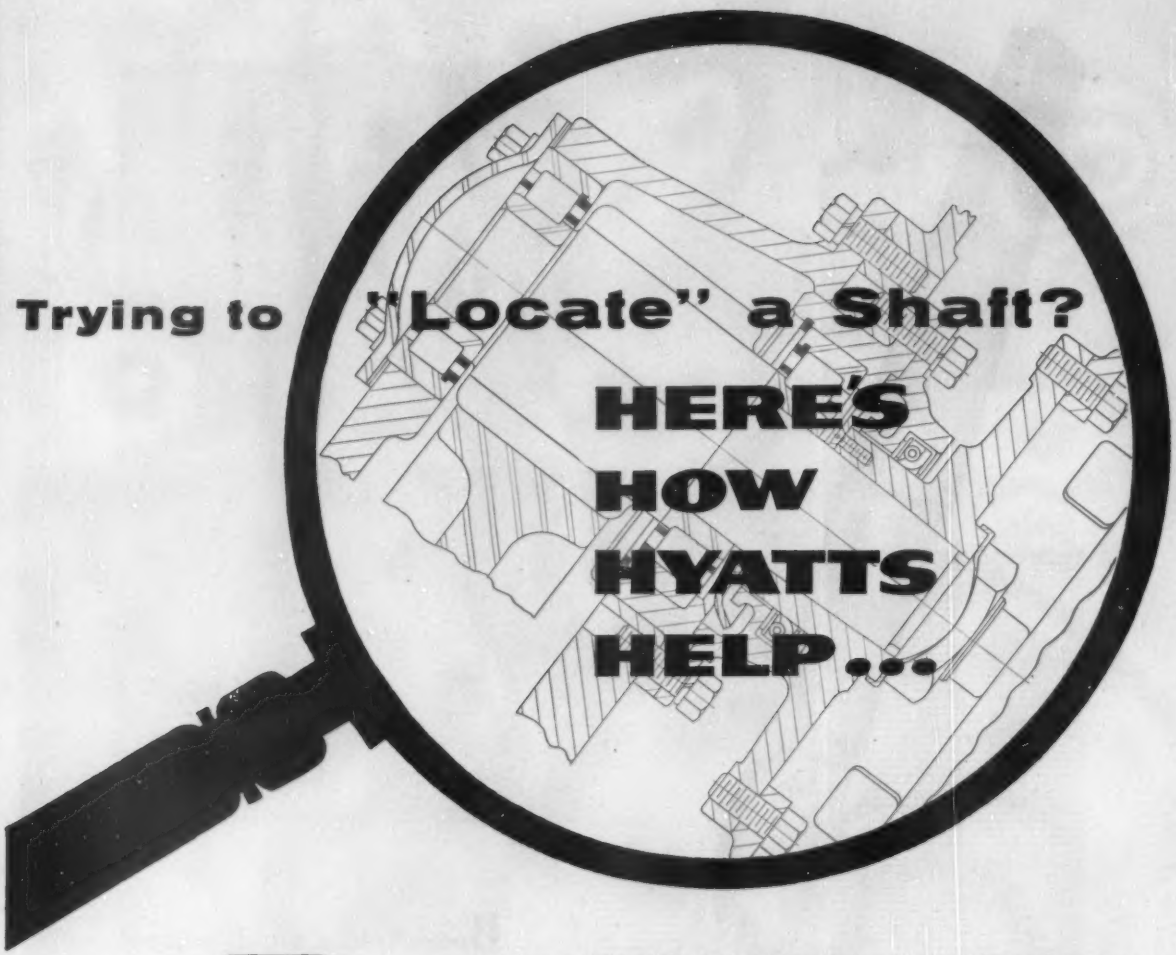
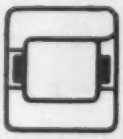
Trying to "Locate" a Shaft?

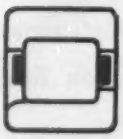
HERE'S HOW HYATTS HELP...



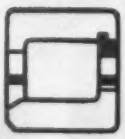
3 TYPES



BU-L
separable outer race series



R-WB
separable inner race series



R-YS
separable inner race series

Shown in section at the left are three Hyatt Hy-Load Bearing types that are used for axial shaft location. Flanges on inner or outer races limit axial shaft movement and permit the bearing to take light, intermittent thrust loads.

Since Hyatt inner races are assembled on shafts, with relatively heavy press fits, no accessory parts are necessary to hold them in place.

Hyatt Hy-Load Bearings are available with a variety of combinations of race flanges, snap rings, cages or separators, so that just the right combination can be selected for each set of operating conditions.

Hy-Loads are available in three diameter series, two widths and a complete range of sizes. For complete information write for Catalog 150—Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

HYATT ROLLER BEARINGS

STRAIGHT BARREL TAPER

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Call us for—Dardelet Rivet Bolts, High Strength Bolts, Blakled (a new rust-inhibiting material), Grinding Wheels, expanded metal, chain and chain slings, welding electrodes, welding machines, clamps, Markal Paintstiks, Galv-Weld (for regalvanizing welded areas), mechanical rubber goods—conveyor belts, transmission belts, all types of hose, V-Belts, structural fabricating machinery, sheet metal machinery.

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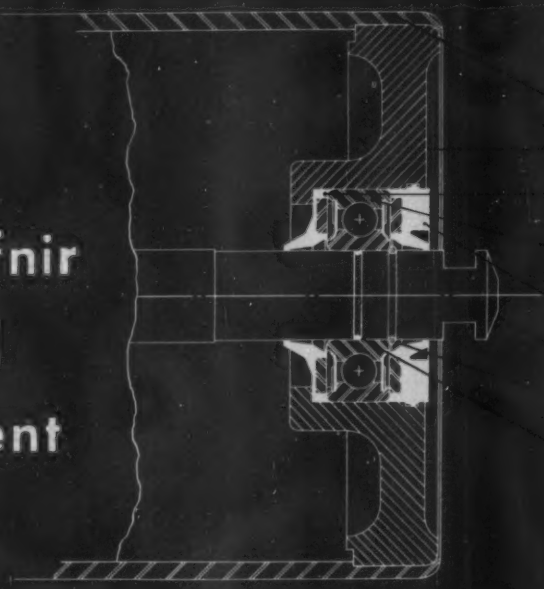
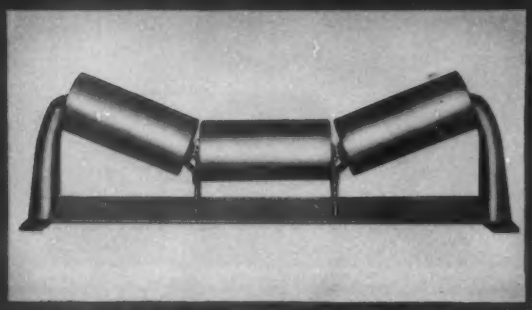
UNITED STATES STEEL

Trouble Fixed Fast...

by Transall-Fafnir Idler Roll Development





The all steel, jig welded frame of this troughing idler insures roll alignment and facilitates belt training. Each idler roll is equipped with two Fafnir Plya-Seal Bearings.

Fafnir-equipped Transall Conveyor for Mine Run Coal. In daily operation since December 1949 . . . 2600 bearings without a bearing failure to date.

Things began to happen when Transall Designers asked Fafnir Engineers to join them in solving a troublesome conveyor problem. By pooling their experience, the answer was found quickly and simply . . . an improved idler roll with advantages beyond anything available.

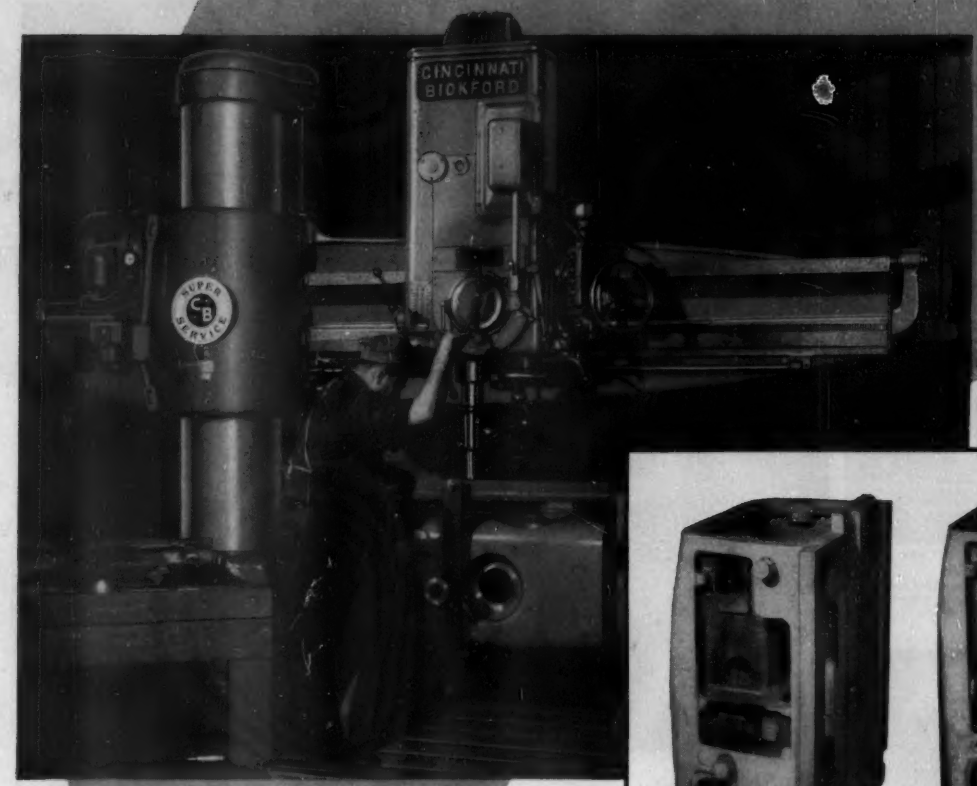
Right from the start, the problem was simplified by centering development around Fafnir Plya-Seal Ball Bearings. Factory lubricated and sealed for operation between —60°F. and +200°F, Fafnir Plya-Seal Bearings never need relubrication. The seals are unaffected by moisture and many other contaminants.

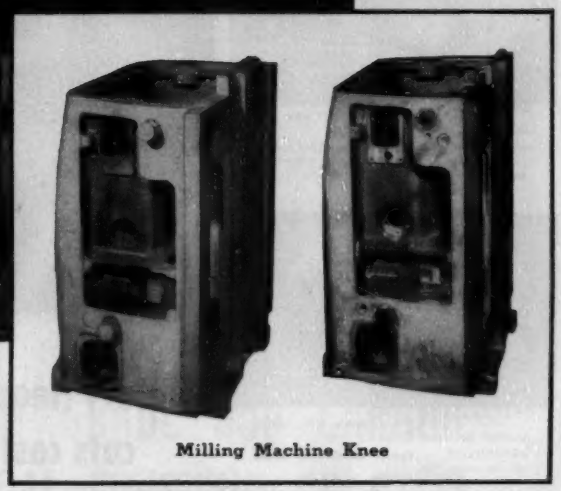
Extra insurance against abnormally severe conditions was provided by chrome plating the bearing inner ring to prevent corrosion and abrasion at the point of seal . . . and by the addition of supplementary, resilient bearing closures.

It's another example of the Fafnir "attitude and aptitude" . . . a way of looking at bearing problems from the designer's viewpoint and the ability to supply the right bearing for the need. If you have a bearing problem, why let it drag. Bring it to Fafnir like most people do. Maybe your trouble can be fixed fast. The Fafnir Bearing Company, New Britain, Conn.

FAFNIR
BALL BEARINGS
MOST COMPLETE LINE IN AMERICA

Bickford accuracy





Milling Machine Knee

Photos courtesy of the George Gorton Machine Company, Racine, Wisconsin

. . . HELPS BUILD ACCURATE MACHINE TOOLS

To .0005″ accuracy, this performance in drilling, reaming and boring 100 holes from ½″ to 2½″ diameter to 3″ deep, to this tolerance, is typical of Cincinnati Super Service Radial Drills.

Here at the George Gorton Machine Company, manufacturers of machine tools, where accuracy is necessary, ten Cincinnati Bickford machines are in use.

Write for Catalog R-29.

CINCINNATI BICKFORD

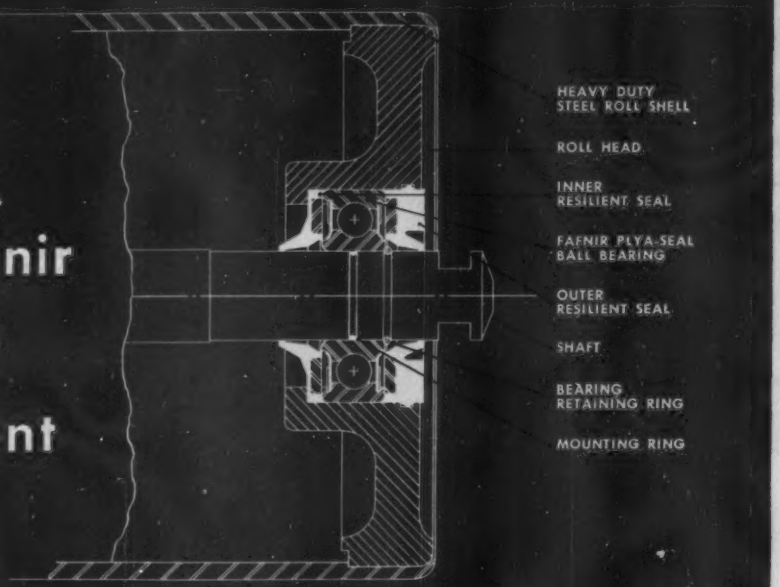
RADIAL AND UPRIGHT DRILLING MACHINES

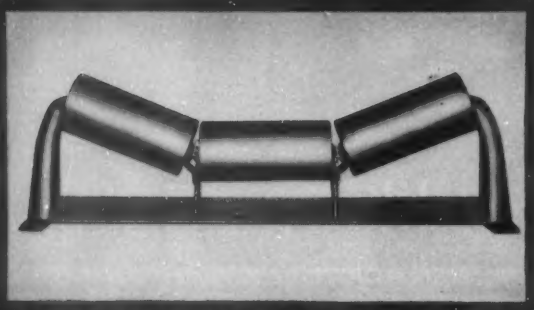
THE CINCINNATI BICKFORD TOOL CO.

Cincinnati 9, Ohio, U.S.A.

Trouble Fixed Fast...

by Transall-Fafnir Idler Roll Development





The all steel, jig welded frame of this troughing idler insures roll alignment and facilitates belt training. Each idler roll is equipped with two Fafnir Plya-Seal Bearings.

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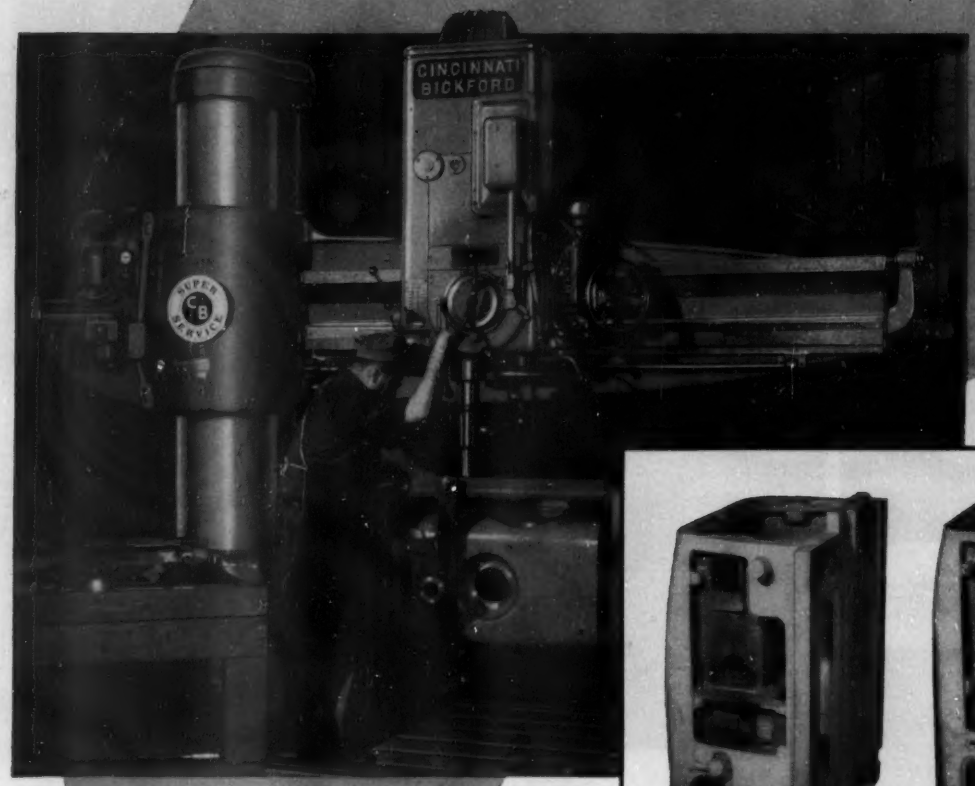

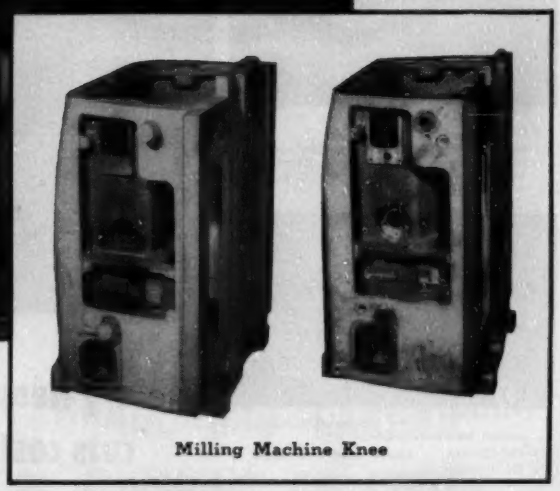

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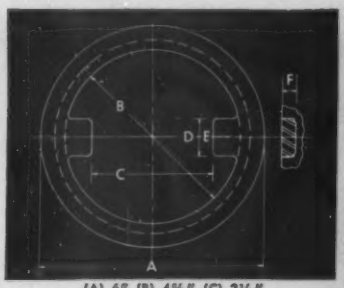
CINCINNATI BICKFORD

RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO.

Cincinnati 9, Ohio, U.S.A.

Production time reduced by 53%!



(A) 6" (B) 4⅝" (C) 3¼"
(D) —1" + ± .000
(E) —1" + ± .005 (F) ⅜"

OPERATION 1 — Rough mill one side of tongue.

PROCEDURE—Offset spindle slide radius (A), set rotary head to angle (B), feed table to work-piece centerline (C to D).

OPERATION 2 — Rough mill radius section between tongue.

PROCEDURE — Rotate head from angle (B) to angle (E).

OPERATION 3 — Rough mill one side of opposite tongue.

PROCEDURE — Feed Machine table from (D) to (F).

OPERATION 4 — Rough mill end of tongue.

PROCEDURE — Feed machine saddle from (F) to (G).

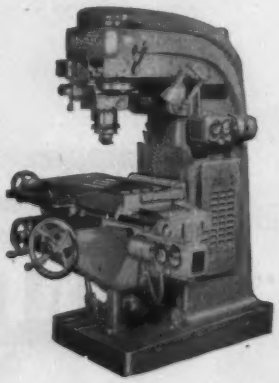
PRODUCTION DATA
MATERIAL — SAE 4615.
CUTTER—¼ dia.—2 lip—HSS endmill.
SPINDLE SPEED — 600 rpm — (80 sur. ft./min.)
LOT SIZE — 25 to 50 pcs.

Rotary Head Milling Machine simplifies method, cuts costs on still another production job.

IN the production milling of this Quick Change Clamp Collar, considerable savings were effected by using a Kearney & Trecker No. 2 Model D Rotary Head milling machine. The entire milling operation on each piece required less than 16 minutes and still maintained the prescribed accuracy. Previous time was 34 minutes.

The job was done faster on the Rotary Head machine than would be possible with any other method. The radii were produced merely by offsetting the spindle slide and rotating the machine's head. The straight surfaces were milled by moving the table and saddle, both of which are independent of the head setting. Only one cutter was used in this single set-up. Think of what this means not only in this job, but also in terms of increased range of operations for other work.

Get the Rotary Head Milling Machine Production Idea Booklet. It contains several examples of how this method has been found exceptionally efficient in solving production problems. It's yours for the asking. Write Kearney & Trecker Corp., 6784 W. National Avenue, Milwaukee 14, Wisconsin.

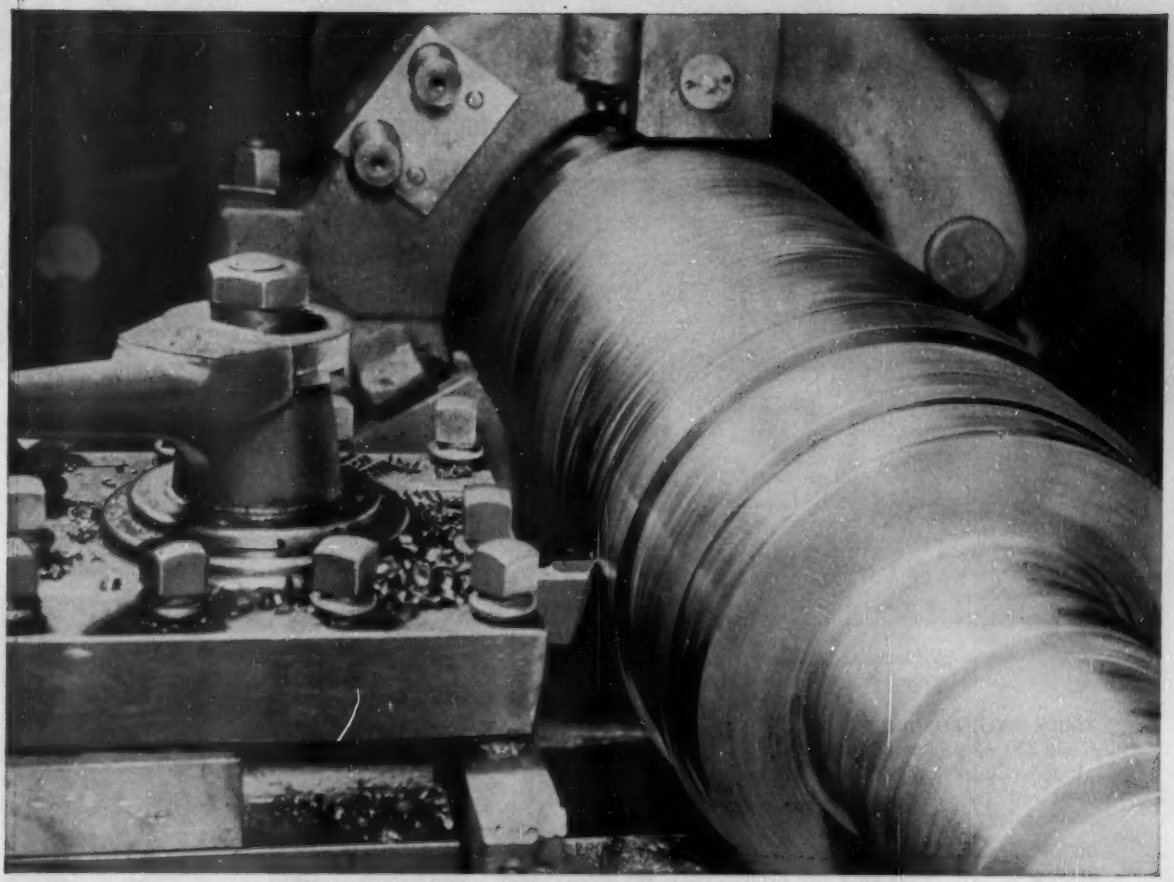


OPERATION 5 — Rough mill second half of inner contour.

PROCEDURE — Repeat Operations 1 through 4, working area to be in the lower half of opening.

OPERATION 6 — Finish mill 4⅛" dia., end of tongues to 3½" dimension and width of tongues to 1" + .000 —.005.

PROCEDURE—Reverse sequence of Operations 1 through 5.



Turning AISI 1045 modified (hot-rolled) steel, Grade 350 increased tool life, cut downtime, lowered unit costs.

CARBOLOY ANNOUNCES NEW GRADE 350 CARBIDE FOR LIGHT ROUGHING, GENERAL FINISHING OF STEEL

On-the-job tests show that Grade 350 cuts faster, lasts longer than existing carbides; boosts production up to 30%

Carboloy® Grade 350—the second of the new Series 300 steel-cutting carbides—combines superior wear resistance and extreme toughness to an extent never before possible in the light roughing and general finishing range of steel machining. This has been proved on exhaustive on-the-job customer tests and applications (photos, operating data on following pages). Grade 350 is outperforming all existing carbides by up to 30% in this medium-duty range.

Built-In Tip Rigidity

A new, carefully controlled manufacturing process gives Grade 350 a unique grain structure and built-in structural rigidity. This rigidity enables Grade 350 to effectively resist the high temperatures (around 1800° F.) encountered during high-speed machining . . . conditions which cause the cutting edges of other carbides to deform.

Two Steel-Cutting Grades Now Available

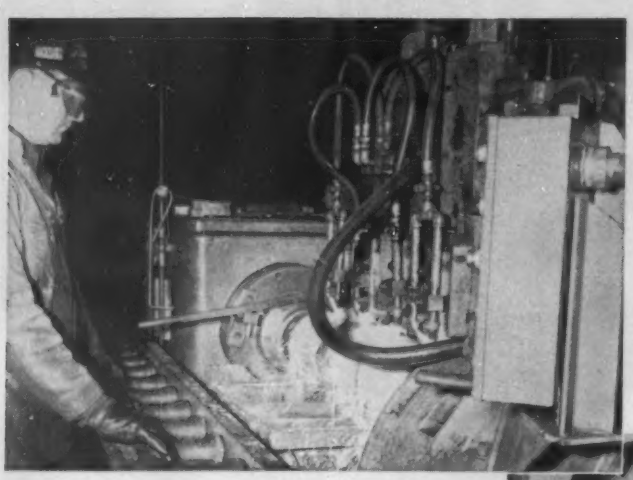
Grade 370 for heavy-duty steel cutting, introduced late in 1953, was the first of the new Carboloy Series 300 carbides. Now Grade 350 extends the machining range of this new series to medium-duty steel cutting. Both grades are available immediately in a wide range of Standard Carboloy Tools and blanks.

Typical in-plant case histories of these two new grades, with photos and operating data, are included on the following pages.

→

CARBOLOY GRADE 350 . . .

For light roughing and general finishing of steel

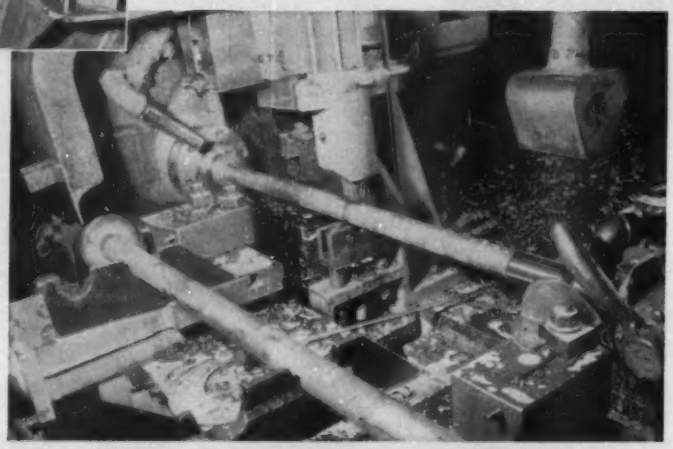


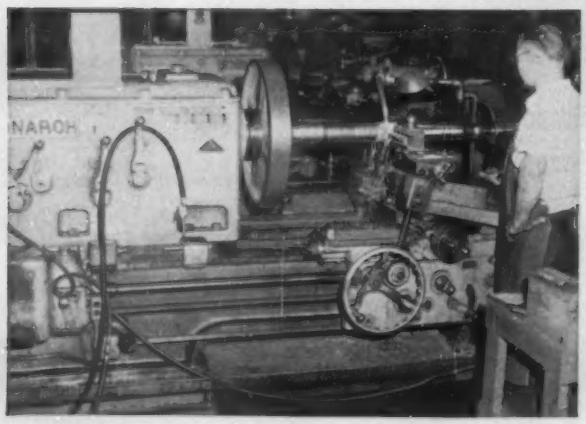
← **8-INCH STEEL SHELLS.** Grade 350 increased production runs on these forged and extruded shells between 15 and 20 pieces per grind. At toughest stage of rough-turning operation, Grade 350 processed 4 times as many shells as other carbides.

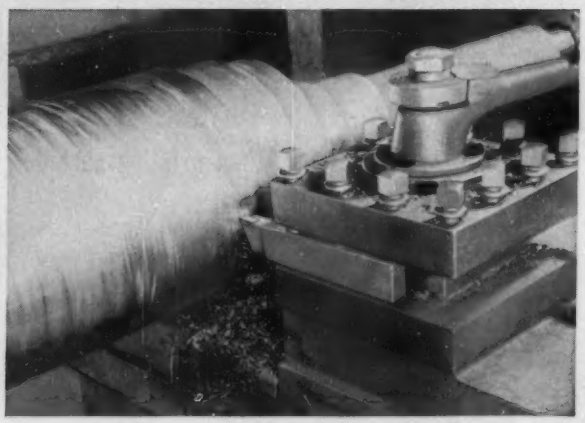
SETUP: Material—1045 steel with varying heat analysis. **Speed**—302 SFPM. **Feed**—0.044 inch. **Depth of cut**—$\frac{1}{16}$ to $\frac{3}{16}$ inch. **Coolant**—No.

TRUCK AXLE FORGING. Turning with Grade 350 resulted in 33% more pieces per tool. Chipping and flaking, encountered with previously used tools, were eliminated. →

SETUP: Material—AISI 4150 steel forging. **Speed**—200 SFPM on 2-inch diameter; 400 SFPM on 4-inch diameter. **Feed**—0.014 inch. **Depth of cut**—$\frac{1}{16}$ to $\frac{1}{8}$ inch. **Coolant**—Yes.







LANDING GEAR PISTON. Other carbides produced 2 parts per grind at 125 SFPM at Menasco Mfg. Co. Grade 350 increased speed to 185 SFPM. Production per grind went up 6 times; downtime was cut ½ hour per shift.

SETUP: Material—4340 heat-treated forged steel. **Speed**—185 SFPM. **Feed**—0.010 inch. **Depth of cut**—0.060 to 0.200 inch. **Coolant**—Yes.

ELECTRIC MOTOR SHAFT. Carboloy Grade 350 increased the number of linear inches cut by 30% over other carbides used for roughing and finishing this large steel motor shaft.

SETUP: Material—AISI 1045 modified (hot-rolled). **Speed**—300 SFPM. **Feed**—0.020 inch. **Depth of cut**—$\frac{1}{16}$ to $\frac{1}{4}$ inch. **Coolant**—Yes.

CARBOLOY GRADE 370 . . .

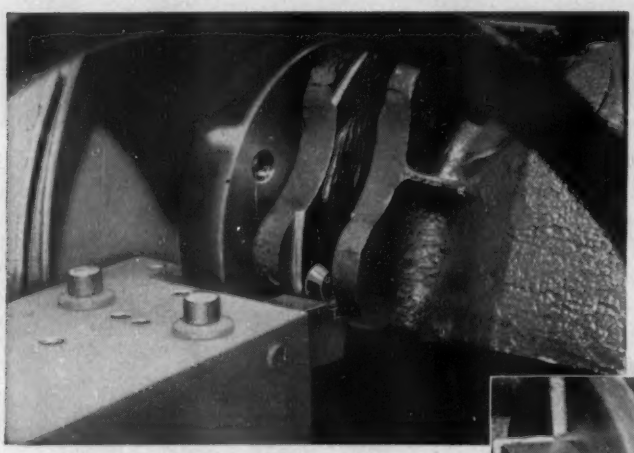
For heavy-duty steel cutting at higher speeds

JET ENGINE TURBINE WHEEL SHAFT. A single Grade 370 tool now handles roughing and finishing at General Electric's Lynn River Works. Formerly, two tools were needed. Though operating at around 1700° F., Grade 370 increased tool life at least 40%.

SETUP: Material—4340 steel with Brinell hardness from 269 to 321. **Speed**—200 SFPM. **Feed**—0.018 inch. **Depth of cut**—⅜ to ¾ inch.

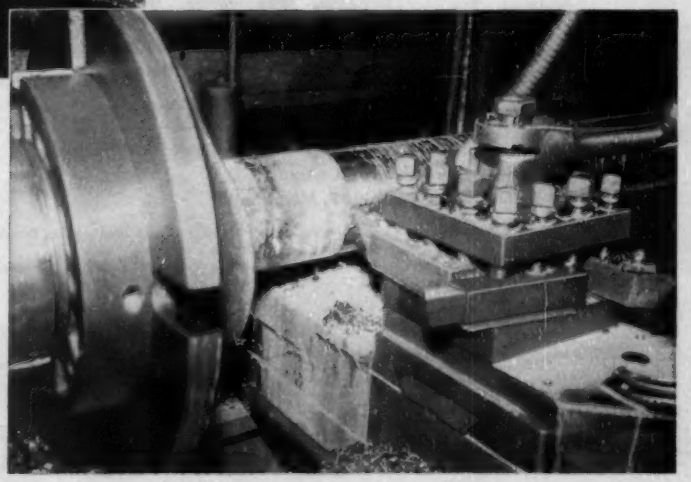
JET ENGINE TURBINE WHEEL RIMS. With Grade 370, G.E. got 300% increase in life of tools used for turning, boring and facing cold-worked Timken steel rims. Downtime was reduced two thirds and tool breakage drastically cut.

SETUP: Material—Cold-worked, forged Timken steel. **Speed**—160 SFPM on O.D.; 110 SFPM on I.D. **Feed**—0.010 inch. **Depth of cut**—½ to ⅝ inch. **Coolant**—Yes.



← **TRANSMISSION CASING** for fork lift truck. Machine downtime was sliced 50% and tool life extended almost 40% when Yale and Towne switched to Grade 370. Despite irregular steel casting, tool life on plunge facing operation increased 5 times with Grade 370.

SETUP: Material—Irregular cast steel with chilled spots and sand occlusions. **Speed**—318 SFPM. **Feed**—0.006 inch. **Depth of cut**—⅛ to ½ inch. **Coolant**—No.



→ **DRIVE ROLLER SHAFT.** Use of Carboloy Grade 370 on this heavily scaled forging reduced machining time 25% at Thew Shovel Co., Lorain, Ohio. Tool life was increased almost 50% and cratering encountered with other tools was eliminated.

SETUP: Material—AISI 1035 hot-rolled forging. **Speed**—336 SFPM.—**Feed**—0.025 inch. **Depth of cut**—½ inch.

Grades 350 and 370 now available in a wide range of standard tools and blanks

Many Standard Carboloy Tools are now tipped with Grades 350 and 370. In addition, blanks and inserts of each grade are available in several styles and in many sizes.

Your Authorized Carboloy Distributor now has complete stocks of tools and blanks to fill most of your requirements. Other styles and sizes are available nonstock.

For more information on medium-duty Grade 350 and heavy-duty Grade 370, and for price lists and specifications, send coupon, today.

For light roughing and general finishing of steel

GRADE 350

STOCK ITEMS

Blanks—6 styles, 40 sizes

Tools—5 styles, 20 sizes

Other styles and sizes available nonstock

For heavy-duty steel cutting

GRADE 370

STOCK ITEMS

Blanks—6 styles, 55 sizes

Tools—9 styles, 26 sizes

Other styles and sizes available nonstock

CARBIDES FOR ALL YOUR MACHINING

In today's competitive economy, carbides can cut your unit production costs on machining all materials—ferrous or nonferrous, metallic or nonmetallic.

Standard Carboloy Tools and blanks in other grades suited for your job are available. Contact your local Carboloy Authorized Distributor or salesman for tooling assistance. Send coupon, today, for free, new Brief-A-Log (GT-280) containing complete specifications and new lower prices!

CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY

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☐ Send Price List GT-300, containing specifications and prices on new Grades 350 and 370

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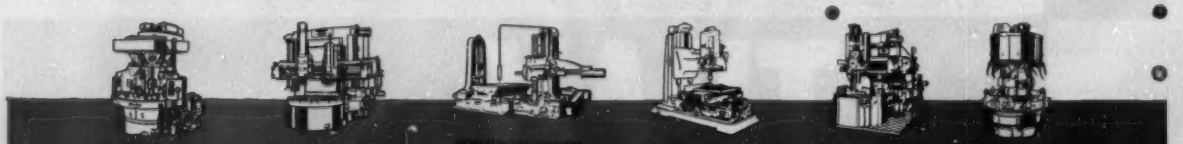
At Phillips Machine Shop in Alliance, Ohio, they rely on Bullard Horizontal Boring, Milling and Drilling Machines. They do general machine work for a number of major manufacturers in this highly industrialized northern Ohio area.

"I choose Bullard," says Mr. Donald Phillips, owner, "because it is the best boring mill on the market. I have carefully checked other domestic and foreign makes. None of them have the weight, the solidity and the reliability of the Bullard machine."



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ATRAX IN ACTION

$3,000 SAVINGS IN LABOR WITH $100 WORTH OF CARBIDE BURS

A CASE HISTORY: One of our customers had an extremely difficult problem of burring some piece parts after assembly. After consultation with Atrax engineers, it was determined that Solid Carbide Burs were the only type that could be used to salvage this huge job. Six Carbide Burs were bought for this job, totalling approximately $100.00. They saved the company over $3,000.00 in labor. Besides this, they made possible salvage of very valuable piece parts for a very nominal original investment.

Possibly our engineers or sales representatives can help YOU achieve similar savings. You'll find them in all principal cities, ready to consult without any obligation.

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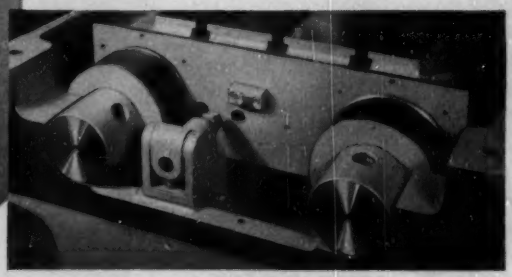
provides...

uniform accurate production



Specifications

Total table stroke	6"
Top of table to top of bridge	4"
Width of bridge	27⅜"
Multiple boring heads as required by tooling to a maximum of (4) 209 heads	
Table dimensions	17½" x 22"
Floor space (without coolant tank)	31" x 54"

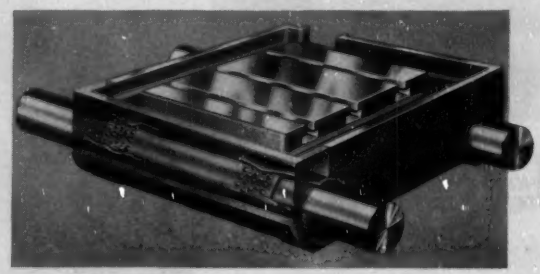
The Bryant 998 Boring Machine is a production machine for precision boring, drilling, turning, facing, grooving and contour turning and boring where fine finish and rapid production are desired.

Constant repetitive accuracy is designed into the Bryant 998. The table is mechanically actuated by a simple cam and lever unit. The cycle is positive . . . free from variation due to temperature change.

The table moves on two 4" dia. hardened and ground solid steel bars firmly bolted to the bed. Each slide bar has two widely separated bearings — hardened steel sleeves surrounding retainers in which 150 balls of ⅜" diameter are mounted under preload.

This rugged slide construction provides metal-to-metal contact, resists loads from any direction, provides sensitive response and uniform travel.

The Bryant 998 will withstand heavy use and will continue to produce parts within tolerance at the specified production rate.



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BRYANT CHUCKING GRINDER CO.
SPRINGFIELD, VT.

Gentlemen: Please send me your Bulletin 998. AM

Name.....

Title.....

Company.....

Street.....

City.....Zone....State.....

BRYANT Chucking Grinder Co.
SPRINGFIELD, VERMONT, U. S. A.

Internal Grinders • Boring Machines
Internal & External Thread Gages • Granite Surface Plates

how high is up?

"Up" is the way production must go to offset constantly growing manufacturing costs.

Don't expect your men operating obsolescent equipment to increase your production through sheer physical effort.

Like many other Lodge & Shipley Lathe owners—you, too, can achieve new heights of productivity with the tireless accuracy of these advance-design Lathes.

Consult your local Lodge & Shipley representative or write us for a file of case histories. **The Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio**

Lodge & Shipley

....your **LODGE**-*ical choice!*

MODEL "X" LATHES
- ENGINE
- TOOLMAKER
- MANUFACTURING
- GAP
- OIL COUNTRY

COPYMATIC LATHES
DUAL TRACER LATHES
DUOMATIC LATHES
T LATHES

UNION

Accuracy...

American "long rifles" of the 19th century, like the one shown here, pioneered in the true accuracy of small arms.

Among all modern cutting tools, those produced by Union are outstanding in their uniform quality, pre-cision and long life.

Hammer and trigger guard of a percussion match rifle built about 1845 by Morgan James of Utica, New York.

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FINE-EDGE CUTTERS

Want high

Edge Strength?

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Write for copy of

"CUTTING TOOL MATERIALS"

Allegheny Ludlum produces *all* types: the various tungsten and "moly" high-speed steels, cast-alloy materials, and cemented carbides. This 36-page booklet analyzes and compares types, and covers grade selection, etc.—invaluable data for production men. *Write for your copy.*

ADDRESS DEPT. AM-53

A midwestern tool manufacturer, specializing in fine-edge cutting tools, has found DBL-2 *best* for their purpose—added proof of the high edge strength and excellent cutting qualities of this high-speed steel.

DBL-2 (typical analysis: C .80, W 6.00, Mo 5.00, Cr 4.00, V 1.75) represents the 6-6-2 or M-2 type of tungsten-molybdenum high-speed steel. DBL-2 combines high hardness with toughness. Requiring no more than reasonable care in hardening and tempering, you will find it a high-speed steel of great possibilities—capable of giving you performance equal to, or better than, the general-purpose tungsten types, and at reduced cost.

DBL-2 reliability has been proved in a wide variety of cutting tools. Let us help you to use DBL-2 . . . our Mill Service Staff is at your command.

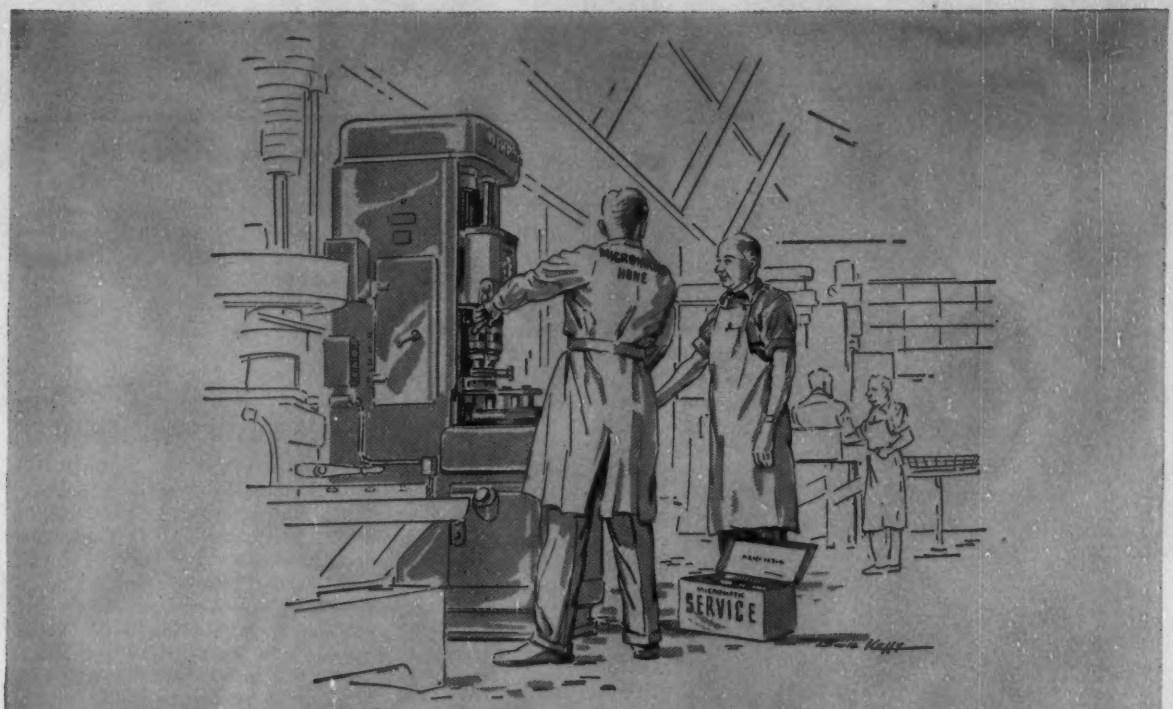
● *Allegheny Ludlum Steel Corporation, Henry W. Oliver Bldg., Pittsburgh 22, Pa.*

For complete **MODERN** Tooling, call

Allegheny Ludlum

AL FINE TOOL STEELS SINCE 1854

W&D 3639



the staff 'without portfolio'

Industrial processors who choose Microhoning are gaining more than a precision-production method of processing. A single source of responsibility for the complete honing operation . . . including machine, tool, fixture, abrasive, and accessory performance . . . is saving them servicing time and expense.

Microhoning's capacity to remove stock, produce a truly round and straight bore, automatically control size, and develop a consistent functional finish . . . is assured by Micromatic's staff of skilled engineers.

This nationwide group of technicians puts into action its cumulative experience to bring out the full potential of every installation. It is a staff which covers every honing phase in projecting Micromatic's acceptance of undivided responsibility.

In effect, it is the customer's staff 'without portfolio.'

1929 • 1954 — PRECISION PRODUCTION THROUGH MICROHONING — 25TH YEAR OF DEVELOPMENT — MICRO MATIC

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Hydraulic controls • Diesel fuel injection equipment

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Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

No Soap

As Bob Hope would say, "Let's not get sickening about this." Sure, a man should try to please his boss if he wants to keep his job. But I think Mr Engle is going a bit too far when he suggests (*AM*—April 26 '54, p105) doing the boss's thinking for him, and I'm sure he is going too far when he suggests going into the office to find out how you can improve your work or your personal habits. The first looks like you are fishing for a raise or a promotion—the second is just plain pandering.

S R Ferguson
Jersey City, NJ

For Sale

The idea proposed by Mr L West (*AM*—April 26 '54, p80) is by no means new, but it works very well in our plant. However, instead of having the gateman weigh up material, which holds up men who want to get out, we have a special booth by the main gate where stuff is weighed and paid for. Then when the man goes out he just gives his receipt to the watchman at the gate.

If a man wants something that is not scrap, and that includes anything we use in production from cutting oil to leather, he puts in a request to the purchasing dep't and it will be waiting for him at the booth at quitting time the next day, and the bill with it.

Henry Lafarge
Detroit

Little Lord Fauntleroy?

Figure it any way you like, but E J Engle's idea (*AM*—April 26 '54 p105) is still apple polishing. In fact that's a very polite name for it. Out in the shop we use another expression you can't print. Does he think we are a bunch of trained seals or something? Try to anticipate the boss's every wish! And suppose we anticipate wrong? Suppose a fresh batch of forgings is trucked in and we figure the boss is going to want them machined just like the last lot, so we go ahead and anticipate his wishes. But it just so happens that this lot is for a different order and they had to be half an inch bigger. Do you think we are going to get a pat on the back and an E for effort? Like Heck! We're going to get a swift kick in the pants for stupidity.

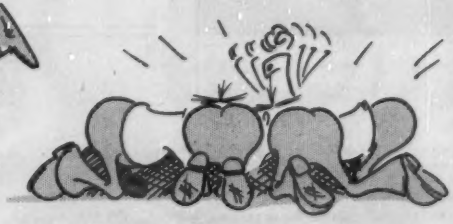
And what do you think the foreman, and the rest of the guys, are going to say to a guy who goes into the office and says, "Please Teacher do I have halitosis, or do my dirty

GRINETICS

By D G SMITH

WORK RESTS

FIBER STRESS



INVESTMENT CASTING

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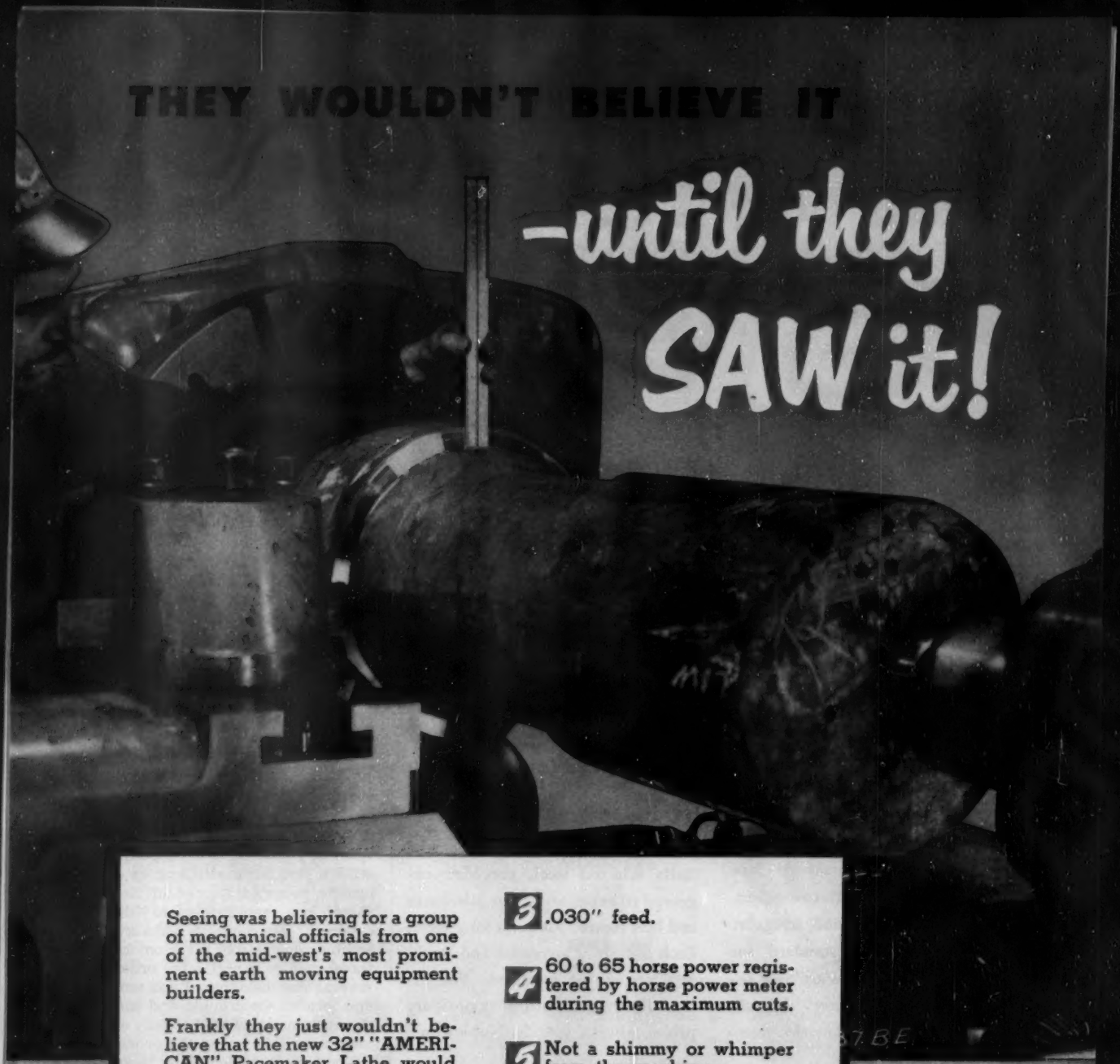

Seeing was believing for a group of mechanical officials from one of the mid-west's most prominent earth moving equipment builders.

Frankly they just wouldn't believe that the new 32" "AMERICAN" Pacemaker Lathe would effectively use 60 horse power and cemented carbide cutting tools in machining rough alloy steel forgings. So they came to see for themselves and they saw:

1. Cuts 1⅛" deep.
2. Cutting speed 300 feet per minute.
3. .030" feed.
4. 60 to 65 horse power registered by horse power meter during the maximum cuts.
5. Not a shimmy or whimper from the machine.

They were amazed and convinced.

This new model Pacemaker is endowed with the power, stamina and convenience that combine to produce a thoroughly dependable and highly productive unit.

Bulletin No. 44 tells all . . . have one?

THE AMERICAN TOOL WORKS CO. Cincinnati 2, Ohio, U. S. A.

LATHES AND RADIAL DRILLS

NOBLEWEST *precision* MARKING DIES

FOR EVERY METAL MARKING NEED

There's a Noblewest steel marking die for rolling or stamping sharp, clear, permanent impressions into every type of metal surface—round, flat, concave, convex and irregular contours. Long the standard for quality, Noblewest dies are used extensively for marking designs, names, addresses, trademarks, numbers and graduations.

Noblewest dies are made of specially selected steel, precision engraved to extremely close tolerances and heat treated for extra long wear. Each is rigidly inspected and Rockwell tested for hardness. For extraordinary quality dies at ordinary prices, always specify Noblewest.

Send detail specifications of your requirements for a quotation, without obligation, of course. There is a Noblewest representative near you. The Noble & Westbrook Manufacturing Company, 17 Westbrook Street, East Hartford 8, Connecticut.

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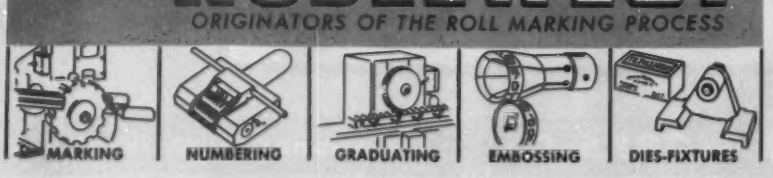
NOBLEWEST

ORIGINATORS OF THE ROLL MARKING PROCESS



finger nails annoy you?" No, sir. If you have any habits the boss doesn't like, you hear about them soon enough. If the boss hates guys who chew snuff, the guy at the next machine will give you a friendly tipoff. If not, I don't want to work for a boss who hasn't got the guts to come and tell me so himself.

Peter Grant
Cincinnati

Expense Account

What do you think of a company that sends a man out to check up on some trouble reported on one of its machines and then refuses to OK his expenses? My company had a serious trouble report from a customer who threatened to cancel a big order for several new machines. I was sent out and located the trouble and showed the customer it was the fault of his own men. So I saved the order and figure I made a good many thousand bucks for my company.

Well, that night I treated myself to a few drinks and a big steak dinner—I figured I had earned it. But when I put in my expense account, the boss said he wouldn't stand for a $20 tab for one day's meals. Isn't there a law to make him pay me? After all, I did spend it when on business for him.

Name Witheld.

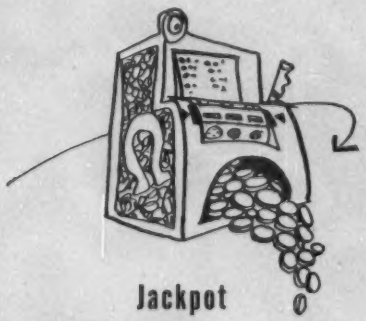
Sorry, we are not lawyers. But we doubt whether you can make the boss pay for your party. You were being paid to locate the trouble, and all you can expect is reimbursement for legitimate expenses, such as rail fare and a normal amount for meals, say about six or seven dollars.—Ed.

Life for a Salesman

You have published a number of letters in the past, most of them from a Mr Colvin, concerning the foolishness of compulsory retirement at 60 or 65. Most of these have been concerned with the fact that many men at 60 had lots of good work left in them and were capable of handling manual jobs without difficulty.

However, your editorial (*AM*—Mar 29 '54, p95) brings the matter more closely to the attention of busy management men who may not have the time or inclination to read other people's letters. Furthermore, it deals more specifically with the much-maligned salesman who is so often condemned to slow death on the sole grounds of age. You are right on every count—experience, resourcefulness, reliability. I trust this may serve to give a new lease of life to many of us old-timers.

H J Swenson
Chicago



Jackpot

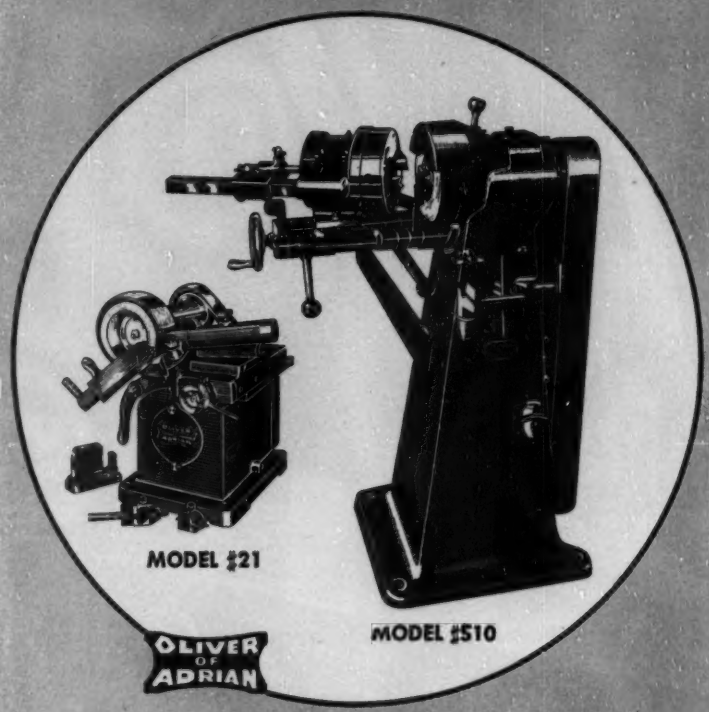
Respecting "Too Good to be True" (*AM*—April 26 '54, p80), I think a lot of employers advertise jobs for more than they expect to pay, just so they won't be bothered with a bunch of second-raters. It may not be quite fair, but then you don't have to take the job if you don't want to accept what they do offer. Of course, you probably don't exactly fill the bill according to the advertised specifications. If you did, your name would probably be Thomas Edison.

For my part I'm always suspicious of the too-good-to-be-true ads, but I keep answering them. It's like dropping nickels in a slot machine—you might hit the jackpot some time.

John Fiels
Milwaukee

OLIVER DRILL POINTERS
Are BEST for *Your* Toolroom

Because... **they give you the only scientifically correct *and* theoretically perfect drill point. Twist drills machine-ground with OLIVER DRILL POINTERS assure uniformity—last from two to three times longer than hand-ground drills.**



Save time and money the Oliver Way:

Improperly ground drills ultimately increase costs—cause rejects and production lags.

Make your drills last longer, cut faster and more accurately . . . at the first sign of dullness or inaccuracy, remove them from the drilling machine — machine-grind them with OLIVER DRILL POINTERS.

No. 510 for drills ¼" to 3"—2-3-4 flute. Variable clearances. Variable point angles. Automatic operation.
No. 21 Oliver Bench Grinder. Hand operated for Drills No. 57 to ½". Right-hand, with an improved point. Attachments are available for grinding oil hole drills, left hand and other special points.

Write for our free Booklet
"How To Produce More Holes With Your Drills!"
See our catalog in Sweet's Directory

OLIVER INSTRUMENT CO.
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MACHINE TOOLS by OLIVER include:
AUTOMATIC DRILL GRINDERS
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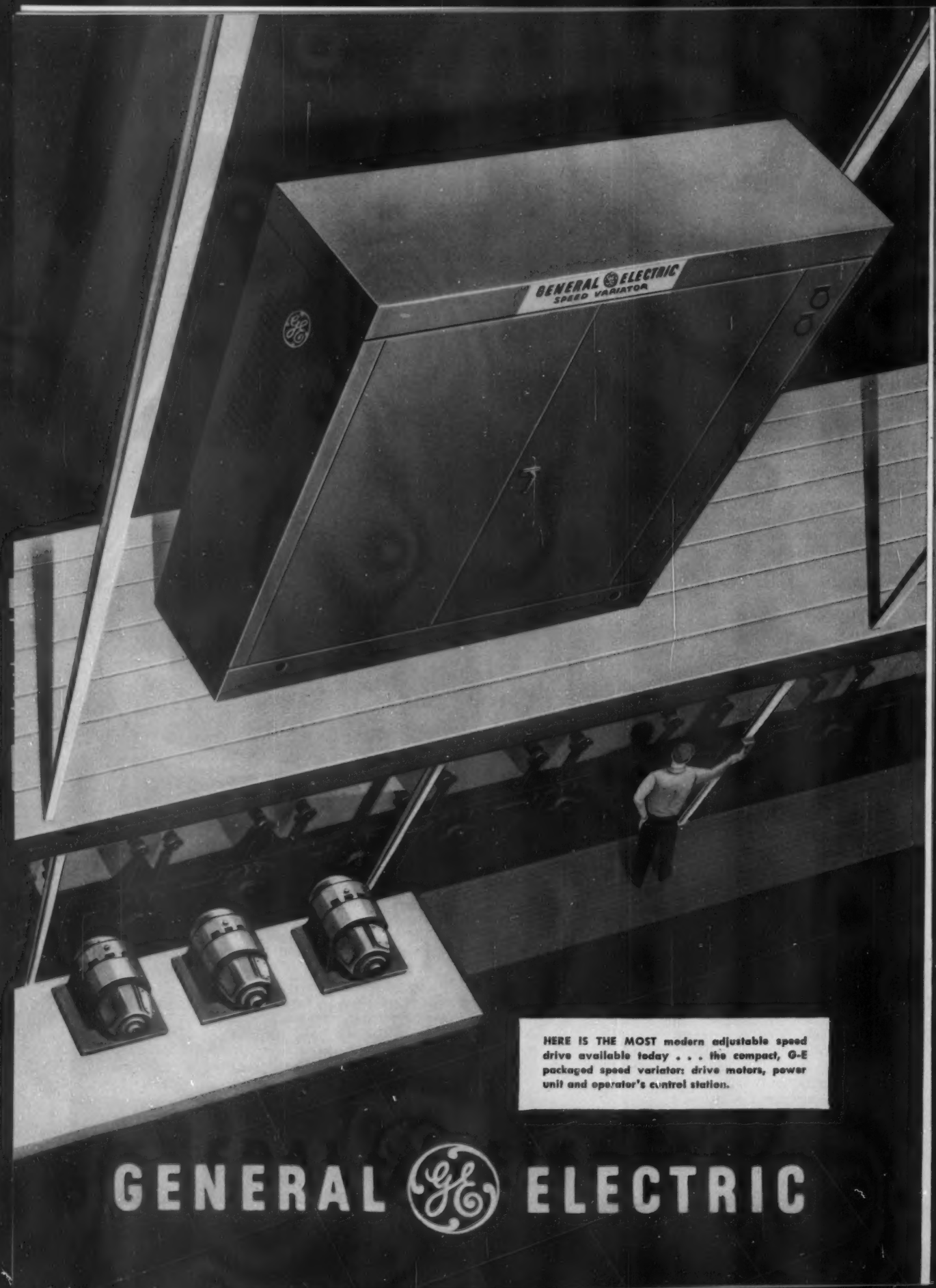
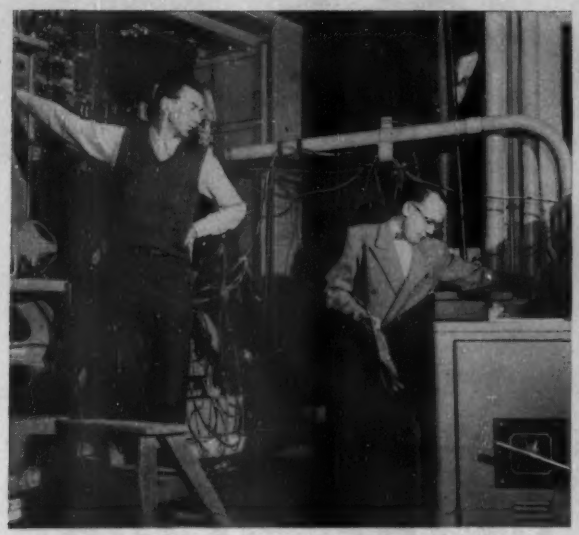


HERE IS THE MOST modern adjustable speed drive available today . . . the compact, G-E packaged speed variator: drive motors, power unit and operator's control station.

GENERAL ELECTRIC



COMPLETELY PRETESTED by G-E engineers in the factory, the packaged speed variator comes to you tailored to your job. Picture shows a power unit on one of the factory tests.

PACKAGED DESIGN of G-E speed variator simplifies installation, saves space and lessens your maintenance problems. Picture shows ready accessibility of all parts.

4 Good Reasons for Buying G-E PACKAGED Speed Variators

There's a *difference* among adjustable-speed drives; here's why the General Electric *packaged* speed variator is your best buy:

1—JOB-TAILORED. When your new G-E drive is delivered, it has already been tailored to your specifications. It's coordinated, packaged, assembled and *completely tested* before it leaves the G-E factory. It's been *engineered* as a package to help meet your needs.

2—MORE COMPACT. Because there are only three components to the G-E *packaged* speed variator (see opposite page), less space is needed for the complete installation. This cuts down on costly, interwiring problems, and leaves valuable floor space available. The G-E packaged speed variator is designed to be located near your equipment . . . up above, in a basement, right next to drive motor . . . anywhere you wish. No need for expensive control housing and associated ventilating system.

3—FASTER INSTALLATION. Your installation costs drop radically and your new G-E drive is in operation faster because it's packaged in the G-E factory before it's shipped to you. Long, unproductive work-stoppages are no longer necessary.

4—LESS MAINTENANCE. Your speed variator is made up of the standard, General Electric controls and rotating equipment that have proven their reliability and long life in many thousands of applications throughout industry. Because of these top-quality G-E components, maintenance is only a routine problem. And even *routine* maintenance is simplified because of the ready-access doors on the equipment. This packaged simplicity pays off in less downtime and actual dollar-savings in maintenance each year.

For further information, see your nearby G-E Apparatus Sales Office, or send in coupon. General Electric Company, Schenectady 5, N. Y.

Progress is our most important product

GENERAL ELECTRIC

Send coupon for your copy of new, 20-page bulletin (GEA-6127) on G-E packaged speed variators.

Section A822-1
General Electric Co.
Schenectady 5, N. Y.

Please send my copy of GEA-6127.

☐ For reference purposes only.
☐ For immediate application.

Name.....

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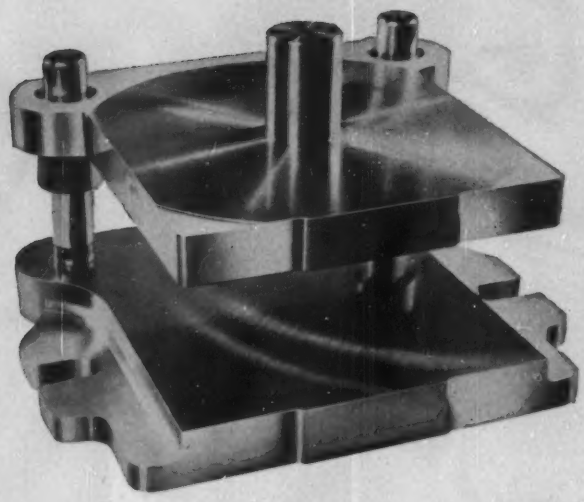
City..... State.....



DANLY'S IN THE PICTURE

at Eastman Kodak Company

Danly Die Sets play an important role in the manufacture of Eastman's popular new Brownie movie camera and Brownie movie projectors . . . latest in the Eastman line that Danly Die Sets have helped build all through the years. Used to mount high precision dies, Danly Die Sets help bring "master die" accuracy to every finished part. But Danly Die Sets do more . . . even before a press run ever starts. They make tooling-up easier, faster—save you many, many hours in the die shop. And once in production, these same Danly Die Sets do their share to maintain non-stop production . . . save down-time . . . increase die life. And remember, Danly Die Set service is as quick and convenient as a phone call.

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue, Chicago 50, Illinois

DANLY

DIE SETS . . . STANDARD OR SPECIAL
DIEMAKERS' SUPPLIES

PICK THE DANLY BRANCH NEAREST YOU!

***CHICAGO** 50	2100 S. Laramie Avenue
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***DETROIT** 16	1549 Temple Avenue
***GRAND RAPIDS**	113 Michigan Street, N.W.
INDIANAPOLIS 4	5 West 10th Street
***LONG ISLAND CITY**	47-28 37th Street
***LOS ANGELES** 54	Ducommun Metals & Supply Co., 4890 South Alameda
MILWAUKEE 2	111 E. Wisconsin Avenue
***PHILADELPHIA** 40	511 W. Courtland Street
***ROCHESTER** 6	33 Rutter Street

**Indicates complete stock.*

• Spot News of Metalworking . . .

- **Automation today has reached the point** where a machine can pierce a hole, chamfer it, probe it to check diameter and depth, insert an article, stake the article in place, inspect the quality of fastening, and apply a sealant.

- **Soviet development of electrical discharge machining processes** has progressed to a point at which such units may be used to cut railroad rails to length.

- **Mexico's peso devaluation** has pulled the props out from under the successful German industrial fair held there recently. Practically every order given at the fair has been canceled by Mexican firms.

- **Titanium alloy with 192,000 psi tensile strength,** and weighing 40% less than high-strength steel has been developed at Watertown Arsenal. Toughness and pliability allow alloy to be shaped.

- **US branch plants are invited to join Dutch industrial combines** in metalworking and other fields. Goal is to help Holland take on bigger orders, improve her position in world trade.

- **High-temperature stainless steel alloys to replace scarce metals** in jet-aircraft building, are being developed by Cornell Aeronautical Laboratories, Buffalo, for the Navy. Chrome-nickel stainless is modified with titanium and boron additions.

- **Titanium sponge plant will be built at Boulder City, Colo,** by M G Mastin, ex-head of titanium production for the US Bureau of Mines, and using a process he developed while in that job—but Washington must OK it—Boulder City is a government municipality.

- **Special wax dip that won't melt below 350 F** is being used by Boeing as a masking agent in chrome, cadmium, copper, silver and nickel plating of metals. Wax can be remelted for re-use.

- **Japan has come up with a combination airplane and helicopter,** the "Heliplane," equipped with a fuselage similar to a Cessna 170-B, a 185-hp Continental E-180 engine driving a two-blade screw, a 3-blade rotor pyron with jet thrust for take-off, hovering and landing.

- **Ordnance's new machine-tool mothballing warehouse at Fort Custer,** Mich, will store "packages" of machine tools from GM, Ford, Chrysler, Evans Products, Franter Mfg Co, US Steel & Wire, Hall Lamp Co and many other firms in its 96 buildings.

- **Chemical "milling" is a term given to an etching process** by North American Aviation, whereby unwanted metal is removed from masked complex or fragile formed parts. Example: waffle construction in wing or fuselage. Etched surface is accurate to 0.002 in.

CHANGE CUTTERS WITH A

TWIST of the WRIST

TOOL UP WITH

CONTINENTAL DRIVE

With Continental Standard Drive Holders you can change cutters with a *twist of the wrist* no matter how severe the operation has been. This will save you time and save your tools.

It is as simple as this: The Continental Standard Drive consists of integral double driving lugs on the shank of the cutter which engage double abutments in the socket of the holder. Double aligning bearings keep the cutter and holder in rigid alignment. The drive is machined from the solid—there are no pins or loose details. Result—a balanced, positive drive which is non-wedging and practically indestructible.

Available in standard counterbores, spot facers, countersinks—and on special tools such as multiple-diameter cutters, step counterbores, radius and chamfering applications. It is equally applicable for inverted operations.

Order through your Ex-Cell-O representative or direct from Continental Tool Works in Detroit.

Continental Counterbores may be purchased individually or in sets. Write on your company letterhead for Catalog 60681.

CONTINENTAL TOOL WORKS
CTW
EX-CELL-O CORPORATION

Continental
TOOL WORKS

DIVISION OF EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

52-25

Washington . . .

The Pentagon has asked the Senate to restore the $250-million Reserve Tool Fund which the house cut from the Defense Dept's fiscal 1955 budget. ODM-BDSA influence had much to do with the request, which was made by Asst Defense Secretary Thomas P Pike, who heads the Pentagon's Supply and Logistics office.

• • •

Pike, a California oil-well drilling contractor, has been a Pentagon official less than a year. He told the Senate Appropriations Committee that failure to restore the Reserve Tool Fund would "dangerously delay mobilization plans."

He revealed officially for the first time that the military services have now drawn up $400 million worth of projects to be financed by a Reserve Tool Fund. He emphasized that these would be carefully scrutinized and reduced before any new tools would be bought. Among the reserve machine needs cited by Pike: 17 stretch-forming presses (by the Air Force), costing $500,000 each and produced by only two firms, boring machines, slab-type planers, gear hobbers, and related equipment.

• • •

Prospects for a census of manufactures next year are very good. The House has passed the necessary authorization bill for this and censuses of business (retail, wholesale, services) and mineral industries to be made in 1955 covering the year 1954. Senate approval is taken for granted.

• • •

Basic legislation calling for censuses to be taken regularly in the "4" and "9" years covering the "3" and "8" years was passed by the Republican 80th Congress. It was hailed as a long-needed step to put fundamental information on business on a regular and coordinated schedule.

But last year, the budget-balancing drive of the Eisenhower administration took precedence over expenditure of new money needed to make the censuses. No appropriations were voted, and the Republicans themselves threw the census-taking off schedule.

• • •

The administration is now set to ask for some $14 million for the Census Bureau to take, tabulate, and publish the censuses of manufactures, business, and mineral industries. But there's still a hurdle: the House Appropriations Committee, whose key men take a dim view of the need for the censuses. But hopes are high that the opposition can be beaten this time.

• • •

The first complete guide to the government's military and civilian procurement is now available. You can get a copy of "US Government Purchasing Directory" from the Supt of Documents, Washington, DC. Price 50 cents. It was published by the Small Business Administration, and lists some 4,000 classes of products bought by both military and civilian agencies. It shows you who buys what and where in the Federal government, and is a companion publication to SBA's "US Government Specifications Directory," now being revised.

• • •

The business outlook — as seen by some of the top Eisenhower aides — is about to take a definite turn for the better. Secretaries Weeks and Humphreys have convinced Eisenhower that the recession has about run its course, that business is on a plateau, and that an upturn can be expected in the fall. Generally, this outlook is the reflection of the confidence officials find in businessmen themselves around the country.

There are some skeptics — mainly in the Federal Reserve Board and the Council of Economic Advisors — but even they are inclined to believe that business slide has gone about as far as it's going to go.

• • •

But now something new has been added that the administration team thinks may throw the economy over to the side of a new jolt of inflation. That's the real prospect that the turn of events in southeast Asia may require a new step-up in military spending. There's no doubt that the US plan to bolster southeast Asia against further attack will cost money. The question is: will more money be needed, or can funds be shifted to such purposes without adding to the budget?

• • •

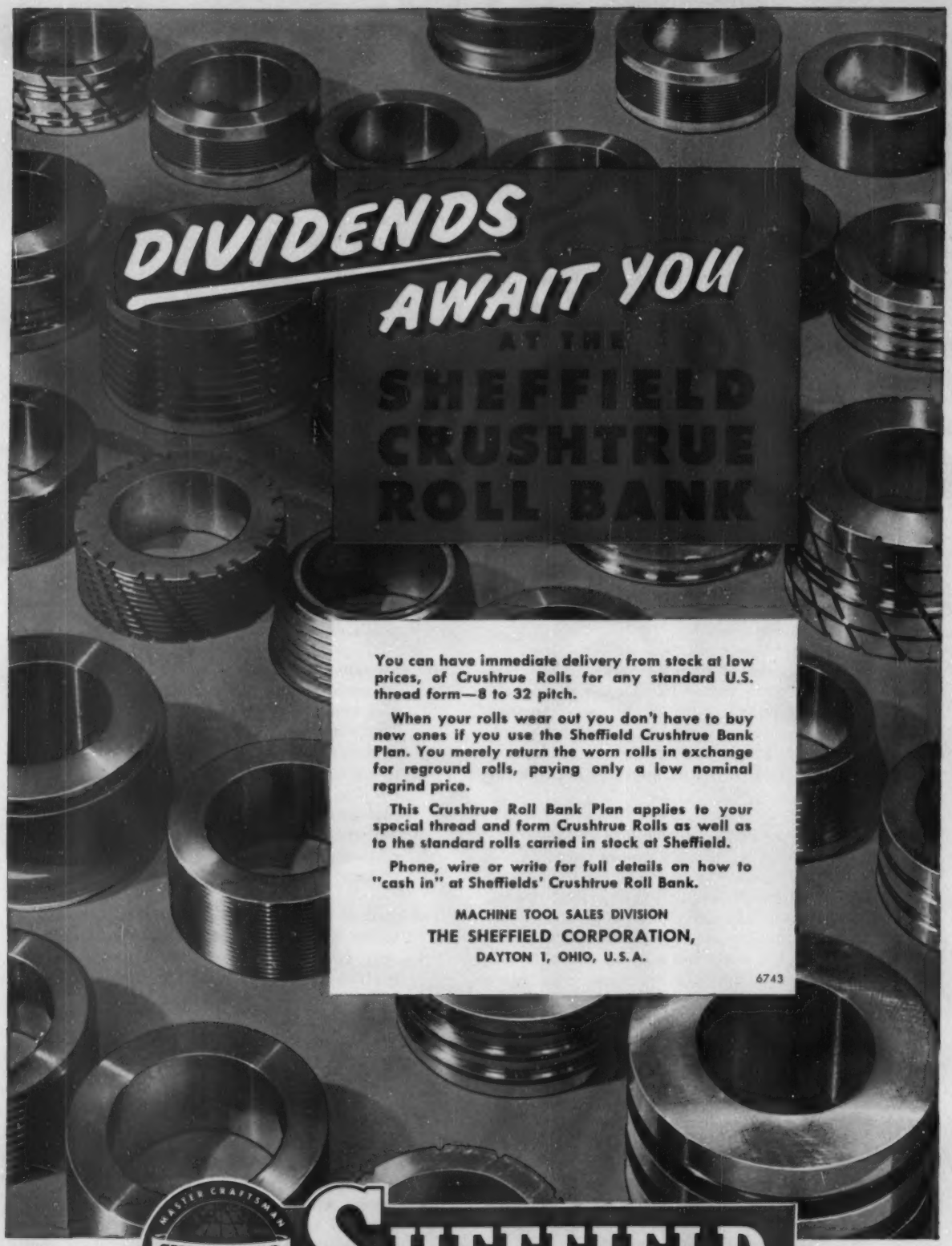
The effect of even a few additional billions for arms would have an immediate impact on the economy, since the figuring is that it would be simultaneous with an upturn in civilian demand.

• • •

Consumer debt — generally the measure of consumer willingness to buy appliances and hard goods — keeps going down. Beginning with the first quarter of this year, consumers began paying off more installment debt than they took on new debt. Washington experts see no sign as of now that the trend will be reversed in the near future.

• • •

Automobile credit and appliance credit is going through the shrinking process. In March of this year consumers took $566-million appliance credit—but they paid off $667-million. Auto installment debt in March a year ago expanded by $66 million; this year it contracted by $100 million.



You can have immediate delivery from stock at low prices, of Crushtrue Rolls for any standard U.S. thread form—8 to 32 pitch.

When your rolls wear out you don't have to buy new ones if you use the Sheffield Crushtrue Bank Plan. You merely return the worn rolls in exchange for reground rolls, paying only a low nominal regrind price.

This Crushtrue Roll Bank Plan applies to your special thread and form Crushtrue Rolls as well as to the standard rolls carried in stock at Sheffield.

Phone, wire or write for full details on how to "cash in" at Sheffields' Crushtrue Roll Bank.

MACHINE TOOL SALES DIVISION
THE SHEFFIELD CORPORATION,
DAYTON 1, OHIO, U.S.A.

6743

MASTER CRAFTSMAN SHEFFIELD HEADQUARTERS

SHEFFIELD

Detroit . . .

Is the bloom already off US sports-car demand, even before early starters really get underway in production?

That's a question some auto makers are pondering. A look at schedules, deliveries and dealer comment clearly shows that customers are not exactly tearing down dealers' doors to get at Corvettes, Kaiser-Darrin 161's or Italias.

Six of Detroit's larger Chevrolet dealers were asked: "If I ordered a Corvette, how long would I have to wait for delivery?"

Two dealers said they could deliver new Corvettes inside of 30 days, or give immediate delivery on used models. (Said one: "I'm just guessing. We haven't had an order for several months.")

Two others said delivery could be made in 60 days, and the remaining two promised delivery in 90 days or less, although both said they could sell their demonstrators immediately.

Not so many weeks ago, Chevrolet was parcelling the plastic cars out to selected customers with infinite care. The 30-day delivery promise at some dealerships is even more surprising, though, in view of Chevvy's failure to achieve full production schedules.

Last winter, the division's 1954 plans were for output of 1,000 Corvettes a month. Present rate is 27 a day, or 540 a month. Production is retarded because matched metal dies for the Corvette's underbody are not yet available; much handwork is still necessary. By June, Chevvy hopes, production will be up to par.

Another plastic entry, Kaiser's sleek 161, has been in production since January. Through April, output totaled 231 units. Current production is running at about 25 to 30 a week. Factory officials say delivery can be made within three weeks after placing an order with a K-W dealer.

Hudson motor car div. is not inclined to talk, publicly or otherwise, about production or sales of its Italia. It's known, however, that output of this sports job is negligible to date.

Ford's Thunderbird, due in the fall, rounds out the field so far. A Ford spokesman says "a great many people have placed orders with dealers" — but offers no definition of a "great many."

• • •

For swift engine switches. Plymouth's present and proposed up-coming performance will be hard to beat.

The company started its 1954 model run with a 6-cylinder, 217.8 cu-in., 100-hp engine. Then it added the Dodge 110-hp, 230.2 cu in., 6-cylinder model.

Present plans for 1955 now call for a V-8 which will use the Dodge V-8 block. And for 1956, Plymouth will have an entirely new V-8 all its own — not a half-breed. Four major engine alterations or additions in three years is probably a modern record.

• • •

When he was in Detroit announcing details of the machine tool layaway program at Ford's Livonia plant — now tooling for car transmission production — Brig Gen J B Medaris, chief of Ordnance's Industrial Div, said the package would be "broken only over his dead body." It would be retained in its entirety in the warehouse Ordnance built near the Ford plant.

Gen Medaris is still very much alive, but the package, it develops, probably will be broken (AM, May 10, p 107.) About 100 machine tools reportedly will be leased to Ford.

"That," says an Ordnance officer in Detroit, "does not mean the package is losing its integrity." The tools will be used at a plant only a mile away from the stored package, could be quickly returned if needed.

If the tools were to be shipped to a distant Ford plant, or if they were leased to another manufacturer, then "integrity" would be lost.

Ordnance will build one more layaway plant, that one in Grand Blanc, Mich, to store extensive tooling that Buick used in production of M-43, M-47 and M-48 tank transmissions. The Grand Blanc building will cost about $1,759,000, as against $1,385,000 for the Livonia warehouse.

Except for these two special warehouses, all other storage will be accomplished as at Michoud, La, where a government-owned plant is being mothballed and tools are being left in place, or in centralized depots, as at Ft Custer, Mich, where tooling from an entire district will be packaged.

• • •

Going into June, car production should total almost 2.5 million this year. Truck output probably will be about 475,000. With a full month of production time left before mid-year, the industry is well on its way to achieving the vehicle production total of 6.2 million some auto executives predicted for 1954.

Through the first quarter, 1,191,021 autos were delivered to customers. Production during the quarter was 1,425,964, says *Ward's Reports.*

Plymouth, shoved into fourth place in production standing by Buick, is in danger of dropping still another rung. Fifth-place Olds in mid-May was less than 1,000 units behind Plymouth, and had outproduced the Chrysler division in each of the two preceding weeks. During March, Olds outsold Plymouth.

And at mid-May Chevvy was back in front in production totals, by an exceedingly slim margin, but Ford still held a narrow lead in sales.

5203-R

IT'S A HAMILTON

INDEED

There is no way under the sun to do small, precision tapping with "production" speed, satisfactory tap life and acceptable accuracy, other than to use a tool designed for the specific purpose.

THE *Hamilton* SUPER-SENSITIVE SMALL HOLE TAPPING MACHINE IS SUCH A TOOL!

WANT ALL THE FACTS

Write for Hamilton Bulletin No. 5203. Address The Hamilton Tool Company, 830 South Ninth Street, Hamilton, Ohio.

IT'S A *Hamilton* Tool

USE IT WITH CONFIDENCE

Machine Tools . . .

Machine tool builders will have to dig in hard and go after business aggressively if they are to be able to maintain present production rates.

That was the general sentiment expressed at the spring meeting of the National Machine Tool Builders' Association at Chicago. Please turn to page 162 for detailed convention report.

• • •

Some builders, particularly those making special machines for the automotive and other mass-production industries, are much busier than others. A small number of companies have comfortable bookings for the year.

Many builders have laid off only a few men to date. They are operating, in certain cases, as much as 50 hr a week on one full shift and part of a second. But a drop in overtime hours appears inevitable in the near future.

Elimination of outside subcontractors has enabled some companies to retain big work forces and a relatively long work-week.

But there is no getting away from the fact that most companies need orders to bolster rapidly shrinking backlogs.

• • •

Decisive action on official authorization for machine tool trade with Russia and her satellites is not likely to be taken before July.

Negotiations among the 14 countries which voluntarily have embargoed certain commodities for shipment behind the iron curtain probably will not be concluded until then.

• • •

There will not actually be a non-strategic list of machine tools that can be shipped to the East.

Instead, there will be a list of strategic machines that are barred from shipment. Any machines not on this list can legally be sent to the Soviet zones.

The items on the embargo list are regarded as classified information by the State Department. This much is known, however—not all general-purpose types of machines will be off the embargoed list.

• • •

The French originated the idea of the embargo. The British joined later. Altogether, 14 nations are participating on a voluntary basis, without any treaty obligations.

The British precipitated the demand for relaxation of the embargo. A large segment of the industry in England feels that the best thing to do is to ship machines to Russia and not force Soviet leaders to develop a huge machine tool building industry of their own.

• • •

The British are divided in sentiment about trading with Russia, as reported previously on this page. The Churchill government is going along with the trading idea, perhaps because it is politically expedient to do so.

Most of the negotiations looking toward relaxation of the machine tool embargo against Russian shipments have been conducted in Paris, though preliminary discussions took place in London between the US and British teams.

• • •

Some 24 Italian machine tool builders will have display space at the Canadian International Trade Fair at Toronto May 31-June 11.

The Italians will outnumber the Germans, who will have 19 exhibits. Six Austrian builders have contracted for space, as have six Swedish firms. Eleven British builders will be on hand.

Sixteen US manufacturers will show at Toronto in the Machine Tools Section, but not all of them will exhibit machine tools. Only three French companies will have displays.

Canadian builders and distributors, as usual, will have the biggest block of space.

• • •

Defense Department plans to stipulate that all machine tools that it buys must be certified as conforming to the permissible limit of radio interference, Tell Berna, NMTBA general manager told the NMTBA spring meeting.

It is not enough for a machine to have a shielded control panel and a shielded motor, he said.

• • •

Sources of radio interference include direct current motor or generator commutators, control elements such as starters, circuit breakers, relays, limit switches. Anti-friction bearings, V-belt or wiring in conduits may broadcast too.

Mr Berna declared that "certification requires a horzontal pattern measurement, radial measurement, harmonic and spurious emission measurement, plus preparation of a report and certification." It is usually necessary to add filters in series with the power lines and provide electrical shielding over certain wires. Just where to put resistors, condensers and filters is a matter of "cut and try."

• • •

Government specifications are so rigid in their radio noise limits that measurement must be in a shielded enclosure, Mr Berna pointed out.

A shielded enclosure is two layers of copper screen insulated from each other, and each grounded.

One laboratory hopes to develop shielding equipment to be used by machine tool builders themselves.

"To a layman this expense (of shielding) seems justified only when a machine tool is going into a battleship toolroom," Mr Berna commented.

BF

"Maintenance costs small, operators like LeBlonds..."

machine tool builder Greaves

Lineup of LeBlond Lathes at Greaves. 17" Rapid Production (foreground), seven 17" Regals and a 15" Regal. Turn precision parts for milling machines on 24-hour schedule. Dependable, versatile, accurate, cost little to maintain.

tells why he uses LeBlond lathes

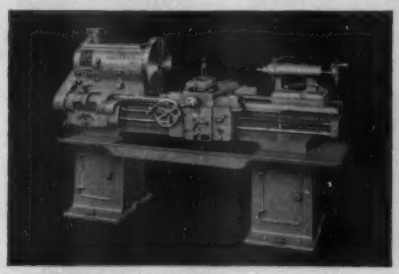
No one knows machine tools better than people who build them. And Greaves Machine Tool Company, Cincinnati, builder of milling machines, owns nine LeBlond Lathes! Eight Regals and a Rapid Production.

Since 1941, some of these lathes have worked almost 24 hours a day on full-schedule production for precision milling machine parts, woodworking machine parts and sub-contract work.

Bill Greaves himself says, "*Maintenance costs are extremely small, operators like working on their LeBlonds—because they're easy to operate, convenient, have a great deal of power for their size. Give long sustained accuracy, especially in boring and turning tapers*".

A machine tool man like Bill Greaves knows what he's looking for in a lathe. His opinion counts. When he says our lathes have what it takes, we feel it's a tribute of the highest order!

Check the variety of jobs these versatile lathes handle at Greaves. Sound like some of the parts production work in *your* shop? LeBlond Lathes can speed up jobs like these, keep your maintenance costs down to a bare minimum.

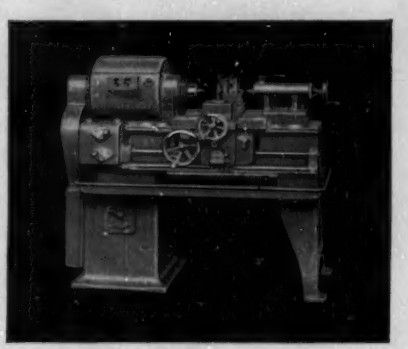


LeBlond REGAL Lathes

Light-duty lathes with heavy-duty features—ideal for production, job shop work and training. Geared headstock, quick change feed box, separate leadscrew and feed rod, taper key drive spindle nose, one-piece apron. Swings—13″, 15″, 17″, 19″, 21″, 24″, and 13″ bench model. 17″, 19″, 21″, 24″ Gap and 17″/28″ Sliding Bed Gap. Write for Bulletin R-A, stating sizes you are interested in.

Typical Jobs:

Bushings • Shafts • Armatures • Expansion arbors for mounting gears • Bevel gear blanks • Spindle for universal head • Sleeve gear blanks for Milling Machines • Tumbler for reverse drive • Formica gear blanks (laminated canvas-based gear material)



LeBlond RAPID PRODUCTION Lathes

Designed especially for low-cost high-production turning. Not a stripped-down engine lathe. Choice of headstocks gives you speeds within the range you choose. Swings—13″, 17″ and 20″. Write for Bulletin RP-A, stating sizes you are interested in.

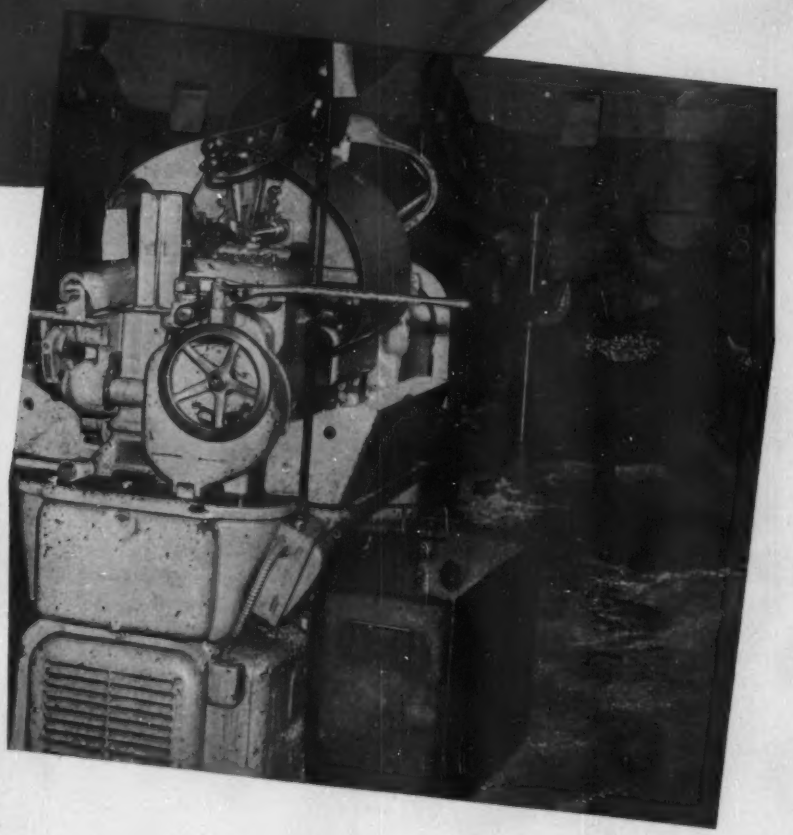
THE R. K. LEBLOND MACHINE TOOL CO., CINCINNATI 8, OHIO

Your nearby LeBlond Distributor will give you all the facts. Call him soon, or write.

turned faster by LeBLOND of Cincinnati

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES—FOR OVER 64 YEARS.

TEN YEARS OF LONG TOOL LIFE AND LOW MACHINE MAINTENANCE COSTS



BENDIX WESTINGHOUSE Automotive Air Brake Company, Elyria, Ohio, keeps dozens of automatics—Greenlees, National Acmes and others—working steadily.

Some ten years ago, a Texaco Lubrication Engineer was called in for consultation on certain cutting oil problems. He recommended *Texaco Cleartex Oil* to be used as both cutting coolant and machine lubricant. Immediately, bearing failures virtually ceased, tool life was greatly extended and machine maintenance costs came down. These benefits have continued now for more than a decade.

Texaco Cleartex Oil—one of the complete line of *Texaco Cutting, Grinding and Soluble Oils*—is especially designed for the double job of coolant and machine lubricant. It has outstandingly high resistance to oxidation. Keeps metal free from rust and corrosion, and has the film strength to protect tools and keep them sharp.

Let a Texaco Lubrication Engineer specializing in cutting coolants help you do all your machining better, faster and at lower cost. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N Y.

TEXACO

TEXACO CUTTING, GRINDING, SOLUBLE AND HYDRAULIC OILS

Gaging Metalworking . . .

PRODUCTION INDEX

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	MAY '54(*)	APR '54(p)	MAR '54(r)	APR '53
Tot. Index...	**143**	**147**	**147**	**169**
Machinery	125	126	126	147
Electrical Machinery	166	163	163	195
Autos	121	116	116	135
Other Transportation	267	267	267	286
Other Metalworking	122	123	123	141

(*) Estimated (p) preliminary r) revised

Business in Metalworking is just about holding its own, if that.

There has been a slight upturn in certain places, but it is purely seasonal and not as much as it should be at this time of year.

Don't get the impression, though, that things are heading into really rough weather.

• • •

Sales are down and have not yet stabilized at any given level. They are running uniformly behind production. And that is no surprise.

But the tone of business is healthy. Sentiment is better than it was even a month ago.

More than that, inventories are worked down to a far lower point than in years. And even the threat of a steel strike is not moving users to lay in tonnage beyond what they have.

• • •

Take gray iron castings—sort of a bellwether of Metalworking activity. Well-equipped, efficient gray iron foundries are operating 4-5 days a week. Some located unfavorably geographically are down to 3 days or less.

Everyone admits that the gray iron industry will produce about 12 million tons of castings this year. That will put 1954 among the top 5-6 years.

There has been a gradual increase in volume month by month from last fall's low.

Malleable iron foundries too are doing better than they were 2-3 months back. All new orders carry short delivery dates. Few will venture a guess about what's in store the rest of the year.

• • •

Steel mills detect a growing volume of inventory fill-in buying. Steel warehouses too are getting their stocks down to the point at which they will be in the market soon themselves.

Jobbers say that long-absent customers are ordering steel again. Deliveries are so good that, in general, many users are buying in small lots and thereby letting mills and warehouses carry their inventories for them.

Steel people are convinced that better days are ahead—in the third quarter. Chicago steel mills, incidentally, are operating above the industry level, thanks to diversification of the industry there.

• • •

Backlog of the commercial stamping industry has dropped for three months and now stands at 10 weeks for automotive customers and 13 weeks for all other classes. Production is 13% below last year. It would have been lower without active support from the automobile industry.

Independent tool and die shops report good orders for automotive tooling. Detroit has helped take up the slack caused by a drop in defense and appliance tooling.

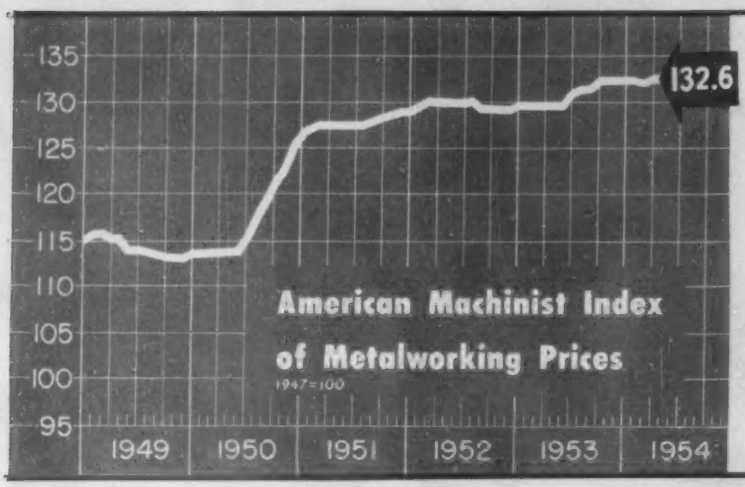
Tool and die business, as a whole, is roughly 15% less than in 1953. Chicago shops are faced by strong possibility of a strike.

• • •

Automobile and aviation parts makers are doing fairly well. But business is spotty. Suppliers to independent car manufacturers are off 35-50%, whereas Ford and General Motors suppliers are maintaining about the same volume as last year.

Construction machinery makers are having a good year. Sales are likely to be high all year, may exceed all predictions.

Gaging Business . . .



PRICE INDEX

	MAY '54(*)	APR '54(p)	MAR '54(r)	APR '53
Total Index	**132.6**	**132.6**	**132.8**	**129.9**
Metalworking Machinery	**141.6**	**142.0**		**138.6**
Other Machinery exc. Electrical	**137.5**	**137.6**		**133.8**
Electrical Machinery	**131.7**	**132.0**		**126.3**
Fabricated Metal Products	**128.8**	**129.0**		**127.3**

(*) Estimated (p) preliminary (r) revised

The unemployment situation is easing slightly — at least it's getting no worse.

In fact, unemployment dropped and employment rose in April. But both the decline and rise are to be expected at this time of year. So when the seasonal factors are deducted, the unemployment situation is not much better and not much worse than it has been recently.

Census Bureau unemployment count for the week ending April 10 showed 3,465,000 out of work — 260,000 less than in March.

But there are 2 million more people unemployed this year than there were in April 1953. Today, 2.1% of the total US population is out of work. However when you compare this with 1939's 7.2% unemployed, it doesn't look at all bad.

And total employment increased 498,000 in April over the March figure for a total of 60.6 million employed.

But part of this increase is due to the spring upsurge in construction, agricultural and retail store activity.

March personal income was at an annual rate of just under $283 million — just about the same as in February, but $800 million less than March a year ago, and almost $5 billion under last July's peak of $287.5 billion.

Income decline is centered around private industry — particularly in durable goods firms, which have cut their workweeks.

• • •

Total business inventories in March totaled $81.1 billion — $1.6 billion higher than a year ago. But after seasonal adjustment, end-of-March inventories were down about $350 million from February.

Inventories of manufacturing companies dropped $400 million in March, but were about $700 million higher than a year ago.

• • •

Manufacturers' sales rose $400 million in March, but were still $1.5 billion less than in March of 1953. Decline since then has centered in durable goods.

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1947-1949 = 100)*	123.3	123.4	133.1
Steel ingot operation (thousands of tons)	1,636	1,654	2,262
Electric power output (million Kilowatt hours)	8,438	8,390	7,897
Production of automobiles and trucks	155,909	159,206	179,621
Engineering construction awards (*Eng. News-Record* — millions)	$344.0	$494.0	$282.2

MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Index of industrial production (1947-1949 = 100)*	123	124	135
Index of durable manufactures production (1947-1949 = 100)*	135	139	155
Durable goods manufacturers' sales, millions*	$11,410	$11,278	$13,116
Electrical machinery manufacturers' sales, millions*	$ 1,368	$ 1,269	$ 1,489
Machinery manufacturers' sales, millions*	$ 1,959	$ 1,968	$ 2,174
Durable goods manufacturers' new orders, millions	$10,342	$ 9,629	$12,520
Electrical machinery manufacturers' new orders, millions	$ 905	$ 1,264	$ 1,268
General machinery manufacturers' new orders, millions	$ 1,685	$ 1,599	$ 2,006

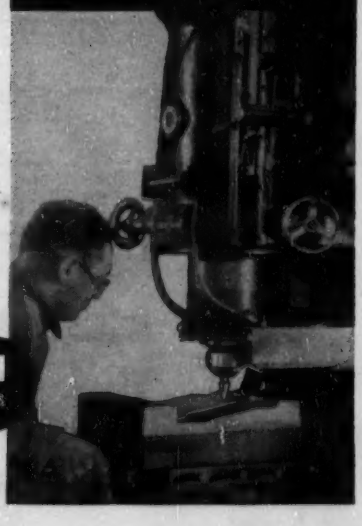
* Seasonally adjusted

T-J toughness

means more work between grinds...

LOWER DIE COSTS!

This T-J Cutter at work on a connecting-rod die block for a board drop hammer. Material being milled is "Hardtem" die steel. A cutter of right design and heat treatment for this high speed work in tough die steels, making possible maximum efficiency of these machines.



LARGEST SELLING CUTTERS FOR TOUGH DIE STEEL

Be sure of *top performance* in die sinking milling cutters . . . specify T-J! They're preferred everywhere today in die and forge shops . . . because T-J Cutters are *extra sturdy* . . . you can raise the feed!

Designed for speed, accuracy and long life . . . hold a sharp edge longer on job after job . . . less breakage! Made from an extremely high grade steel . . . properly machined . . . scientifically heat-treated and accurately ground. Wide range of styles and sizes to *reduce your* die costs. Send for new catalog 4-153. The Tomkins-Johnson Co., Jackson, Mich.

FOR TOUGH JOBS SPECIFY

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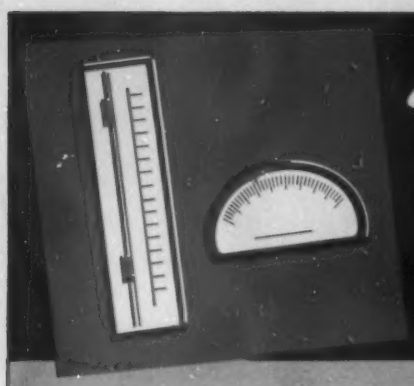
RIVETORS . AIR AND HYDRAULIC CYLINDERS . CUTTERS . CLINCHORS

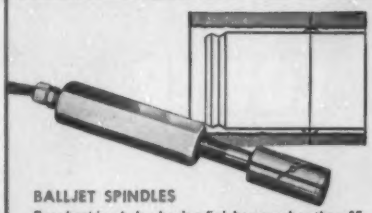
38 YEARS EXPERIENCE



Modernize FOR LOW COST PRODUCTION with Newest Developments In Air Gaging

Already these newly developed practical precision tools are helping produce more and better products at lower cost in innumerable plants throughout the world.

Space restrictions here preclude anything more than the briefest description. Phone, wire or write for specifications, prices and delivery—or call the Sheffield sales engineer in your vicinity.



BALLJET SPINDLES

For checking holes having finishes rougher than 65 micro-inches, for porous parts, narrow lands or checking to the very end of a hole. Setting is made with gage blocks and a Standard Calibrator. NO MASTER SETTING RINGS REQUIRED—not even one.

ADJUSTABLE SPINDLE KIT

One, two, three or four spindles may be quickly assembled from components in the kit, for any size between 1 and 3 inches. Gage blocks are used to set for size and to calibrate air gage for amplification.

ADJUSTABLE AIR BORE GAGE

A light, high precision (2,000 to 1 amplification) self-centering bore gage that is easily adjustable from 3" to 12" in diameter. Calibrated by a Standard Calibrator and gage blocks.

AIRETEST INDICATOR

Replaces an indicator where more accuracy and higher amplification are required. Always gives precise readings regardless of the direction of approach. No lag—no gears—nothing to wear out of adjustment. Amplifications up to 5,000 to 1.

AIRELECTRIC HEAD

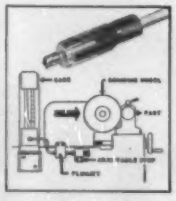
Converts air pressure variations at the gaging contact into electrical impulses which actuate classification and segregation mechanisms or machine control devices. Accurate to a fraction of a "tenth".

ELECTRO-PNEUMATIC UNIT

A self-contained unit of Airelectric Head, indicating dial and signal lights. Easily mounted on the machine to control machine operation by precision measurement of the machined surface. Makes machining automatic. Also used for automatic gaging and segregating.

PLUNJET FEED GAGE

The key element of the machine "Feed Gage" which eliminates error due to feed screw wear. Also, due to the high amplification, makes it easy to manually control the feed to fractional "tenths".



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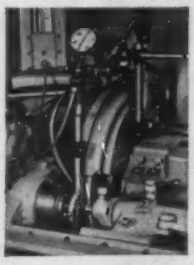
Air Gaging Cartridges are used with Caliper Gages for continuous sizing of work on external grinders. Dial is used for approach—PLUNJET brings to final size.



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MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

An "Ace" Insurance Policy

Have you ever seen a play by the famed dramatist Anton Chekhov? There is lots of fine and sometimes brilliant talk, but that is about all. Nothing much ever happens.

The Washington situation affecting mobilization for emergency defense production reminds us of a Chekhov play. Many words are spoken and written, but there is little action.

After South Korea was invaded in 1950, we had to go through the same long, painful and hectic experience of tooling for military output that we went through at the beginning of World War II. That was because we destroyed our war-production machine after the war much faster than we had built it in the first place.

Come Korea and our national reserves of machine tools were a mere skeleton of what they were in 1945. That meant feverish building of machine tools once again. There was no other way to get the required number of machines for defense plants.

In 1952, a distinguished group of industrialists and retired military men set to work planning to avoid a repetition in any future emergency of what happened in 1941 and in 1950—our being caught completely unprepared. They came up with a comprehensive report in January 1953. It embodied what is popularly called the Vance Plan.

At the core of this plan was the idea of attaining the highest degree of national security with the least drain on the nation's economy. It would establish production capacity as more important than a stockpile of quickly outdated weapons. It would keep that production capacity up-to-date.

It would develop new machines and production processes concurrently with development of new weapons. It would do everything possible to keep modern the country's entire industrial plant and the military services' reserve machine tool holdings.

It was a revolutionary concept of how to shorten the time to get the greatest security and to reduce the cost of maintaining that security over a long span of years.

The Vance Committee asked for Congressional endorsement of its plan. That endorsement was given when Congress appropriated $250 million for the building of long lead-time machines (sometimes called elephant tools).

Up to that point, which was a year ago, things went fairly well. But from then on, right up to now, nothing has happened but fine talk, and not even much of that.

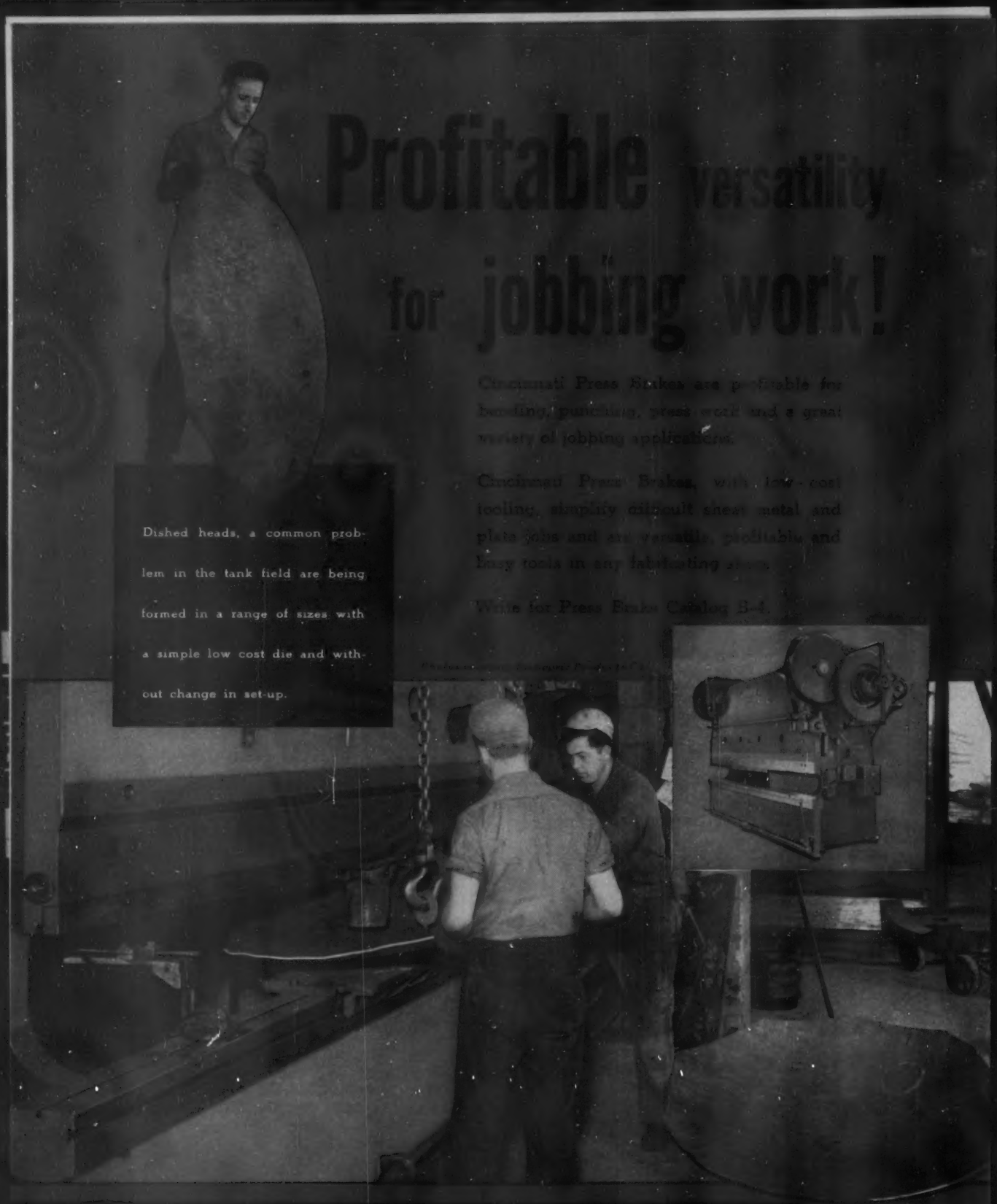
Defense Secretary Wilson saw fit to pigeonhole the $250 million appropriation. It has gone unused through fiscal 1954. There has been no explanation, official or unofficial, of Mr. Wilson's disinterest. For $250 million to go begging at Pentagon is a phenomenon scarcely ever before encountered.

This appropriation will cease to exist on June 30. Pentagon has suddenly come to life and wishes the sum included in its 1955 budget. The House committee has tossed it out, but the Senate committee is for it.

We urge Congress to include the requested $250 million in the fiscal '55 military budget. But more than that, we ask that Secretary Wilson make use of it without delay in the national interest.

If there is any one item relating to the nation's tooling in a defense emergency that we should do something about ahead of time, it is elephant tools. They take a year to 18 months to build. We cannot afford to wait until we are in another Korea or World War to start building them. Using the $250 million to build them now is an "ace" insurance policy for all of us. It is a piddling sum to spend for the protection it will give us in speeding emergency defense production.

Burnham Finney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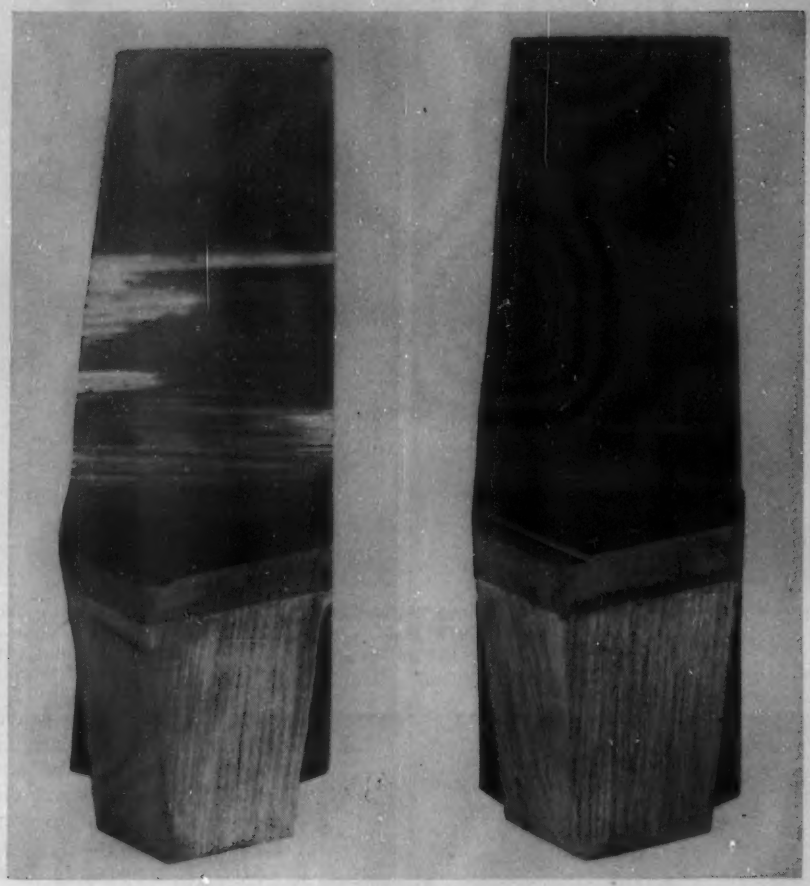


OLD METHOD, right, wastes time and diamond wheel, while new method produces a chipbreaker long enough for full depth of cut to be taken by tool, saves time and money

Shorter chipbreakers save diamonds

Limit length of carbide chipbreakers to depth of cut, then wet-grind the chipbreaker to full depth in one pass ... You'll save diamonds, time, and effort

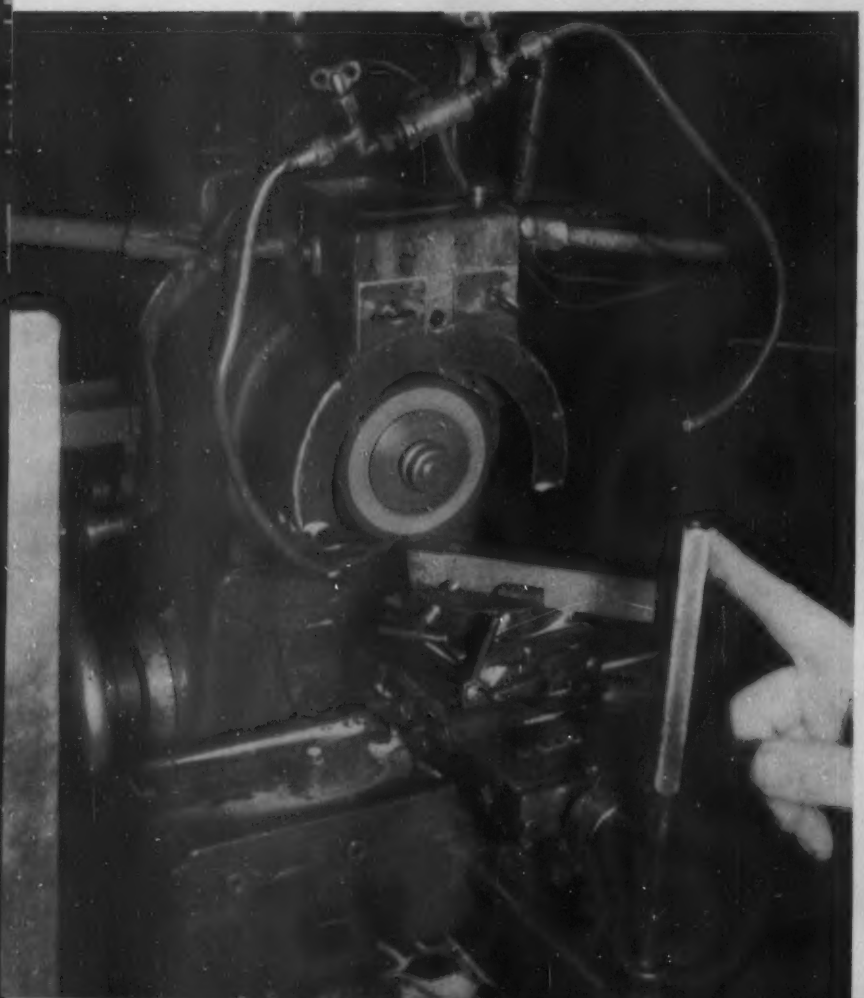
WAYNE A FANGER, general foreman of tool grinding, Fort Wayne Works, International Harvester Co

Conventional practice when resharpening chipbreakers on single-point carbide-tipped tools wastes carbide and wears away diamond wheels more rapidly than necessary. To cut these losses, the Fort Wayne Works of International Harvester Co has radically changed carbide-tool resharpening methods.

New grinding methods were adopted after many test grinds and production trials of tools. With the changed methods, rough grinding is cut to the minimum necessary to remove full cutting edges —keeping in mind that some of the cutting edge will be removed when finishing front and sides of the tools. What remains of the old chipbreaker on a tool is left intact. Where a dull chipbreaker is cratered or chipped, only enough of the top face of the tool is rough-ground to make sure the new chipbreaker will clean up the damage,

DOUBLE CHIPBREAKER ground on end of tool which will be used for plunge cutting operation

OLD CHIPBREAKER need not be ground away when resharpening tool. After rough grinding clearance and rake, to make sure tool face will "clean up," new chipbreaker is ground right over old



when it is finished to proper size.

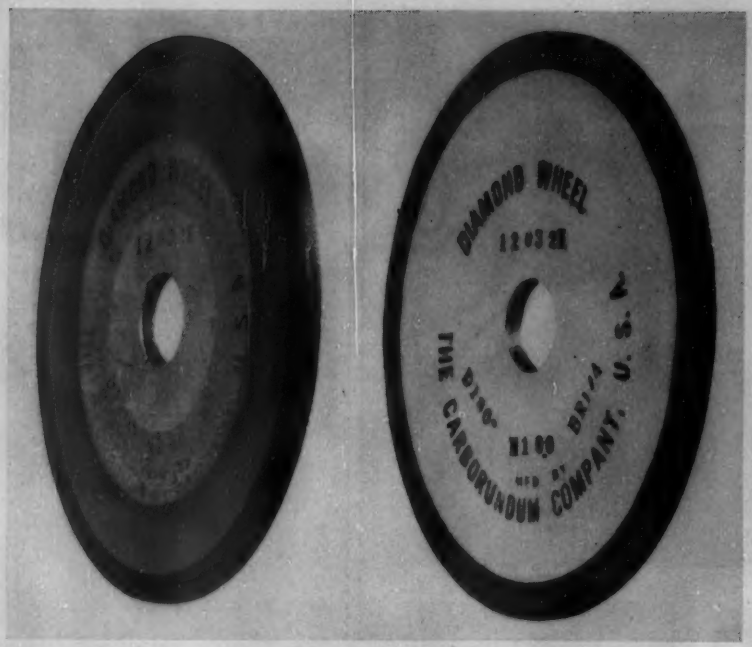
Rough and finish grinding on clearance and top rake are done with silicon-carbide and diamond grinding wheels in conventional offhand operations.

After clearance and rake are finish-ground, the tool is set up in a conventional chipbreaker grinder. The wheel is set to grind the chipbreaker to full depth and width in one pass under the wheel. Coolant is directed toward the grinding area and the tool is slowly fed into the wheel.

Rate of feed is critical, but operators soon develop the proper "feel" to insure that the wheel cuts freely without crowding the work. When properly done, wet full-depth (sometimes called "plunge-cut") grinding of chipbreakers with diamond wheels produces smoother cutting edges, and takes less time than grinding the same-size ledge with successive 0.001- to 0.002-in. passes.

When feeding the tool against the wheel, the grinder table must

SETUP FOR PLUNGE-GRINDING of chipbreakers. Pressure of one finger should be enough to feed tool into wheel

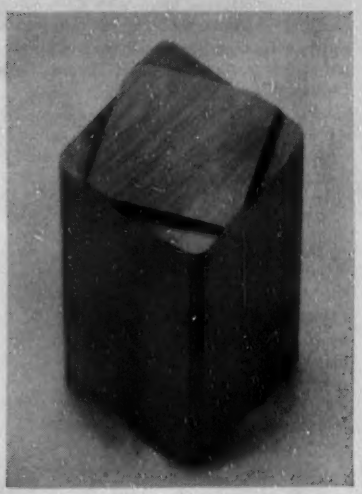


WHEEL AT LEFT had ground 12,717 chipbreakers on carbide tools with only 3 dressings, in 8 months of use. 20% of useful life has been spent. Wheel edges are smooth and square. When this wheel had ground 22,000 chipbreakers, with only 7 dressings, edges were still in excellent condition, and periphery of wheel was not grooved

PLUNGE-GRIND for round solid-carbide insert is produced by taking series of straight passes across edge of tool, eliminating peripheral grind (rough on grinding wheels) of ledge

Date	Number chipbreakers ground	Dressing	Amount dressed from wheel, in.	Diameter of wheel after dressing, in.
12/1/52	0	New	——	4.003
1/16/53	2,194	First	0.005	3.987
5/15/53	8,910	Second	0.016	3.953
7/10/53	11,822	Third	0.026	3.893
8/5/53	12,717	(Record only)	——	3.890
8/27/53	13,860	Fourth	0.007	3.879
10/9/53	17,581	Fifth	0.006	3.854
10/19/53	18,451	Sixth	0.009	3.832
11/19/53	20,687	Seventh	0.004	3.828
12/1/53	22,169	End of Test	——	3.818

WHEEL WEAR has not been uniform, because coolant tests and operator training led to variation in operating conditions. It will be noted that the tests, begun Dec 1, 52, and running for one year, have used up 37% of the wheel's potential life. Barring accidents, wheel should be good for at least 30,000 more chipbreakers



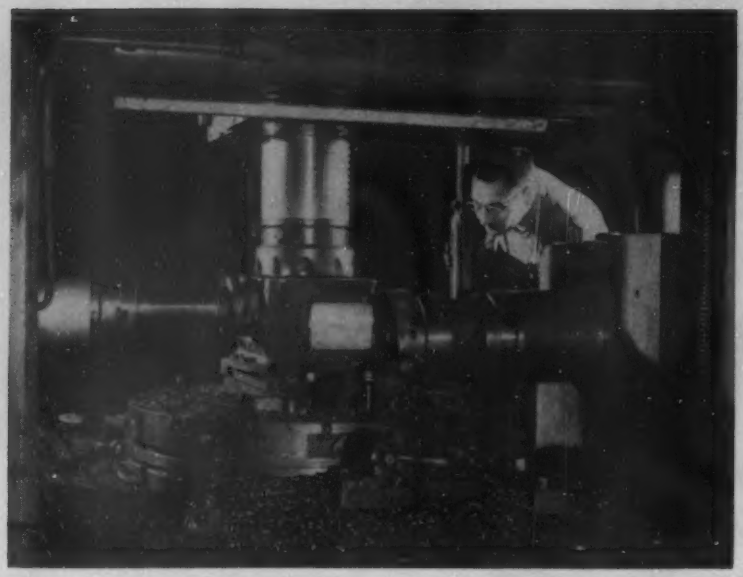
SMOOTH, SHARP EDGES on chipbreakers of this square solid-carbide insert were wet-ground with diamond wheel that had cut some 4800 chipbreakers since dressing

move smoothly and freely at a slow rate, without any "sticky" action or hesitation. Tables traversed with a lever through a rack-and-pinion are better than those with a lever linkage. The table should be adjusted so one finger on the feed lever will move the tool smoothly through the cut.

Length of chipbreaker is limited to the depth of cut to be taken by the tool, which cuts to the minimum the work required of diamond wheels, prolonging wheel life materially. The diamond wheel, a 4 x ⅛ x 1¼-in. Carborundum D180-N100-BR ¼, rotates at 3450 rpm (3613 sfpm). The wheel rotates against the direction of table travel, because climb-cutting is not desirable.

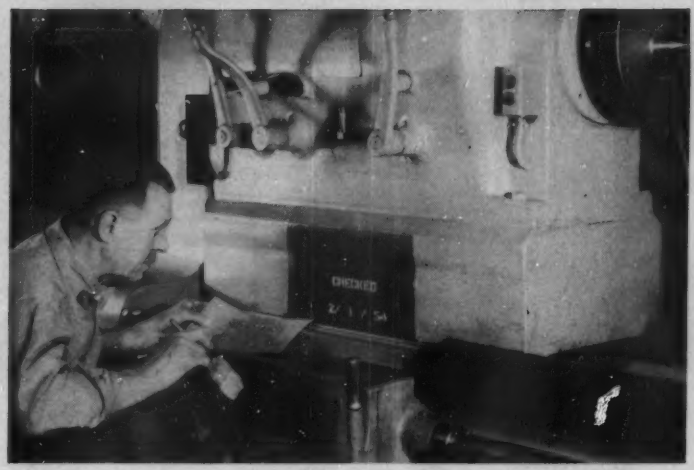
Several coolants, including kerosene, have been tried; the present product is a solution of 1 part Quaker Micro-Grind No. 70 and 5 parts water. Coolant is pumped from a 2-gal tank (mounted on the floor near the grinder) through a 5-gpm pump to a manifold near the wheelhead, and discharged through ⅛-in.-ID copper tubes—one on each side of the spindle (so the table can be traversed in either direction).

Rate of peripheral wear of the wheel is so slow that extra care must be taken not to chip the corner of the wheel while positioning, because wasteful dressing would be needed to clean up nicks which, with the old method, would be worn away by wheel wear.

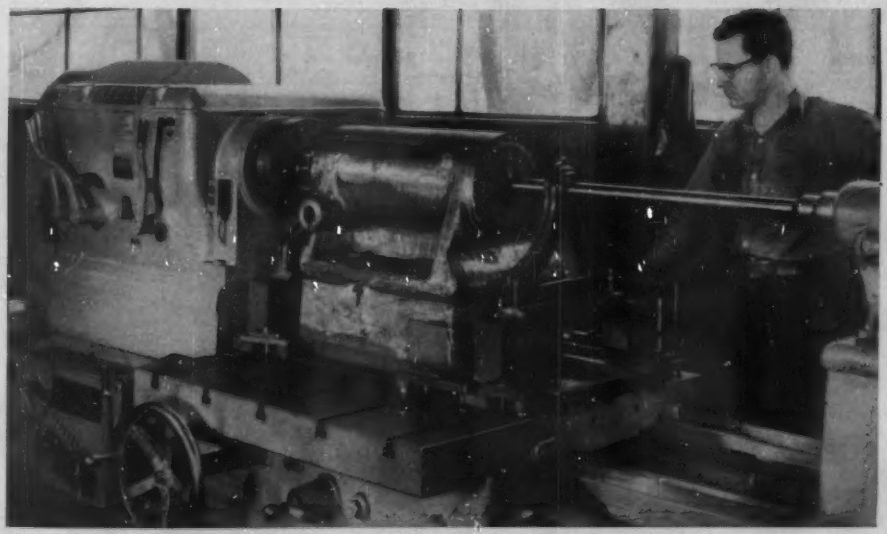


SHOP SHOTS

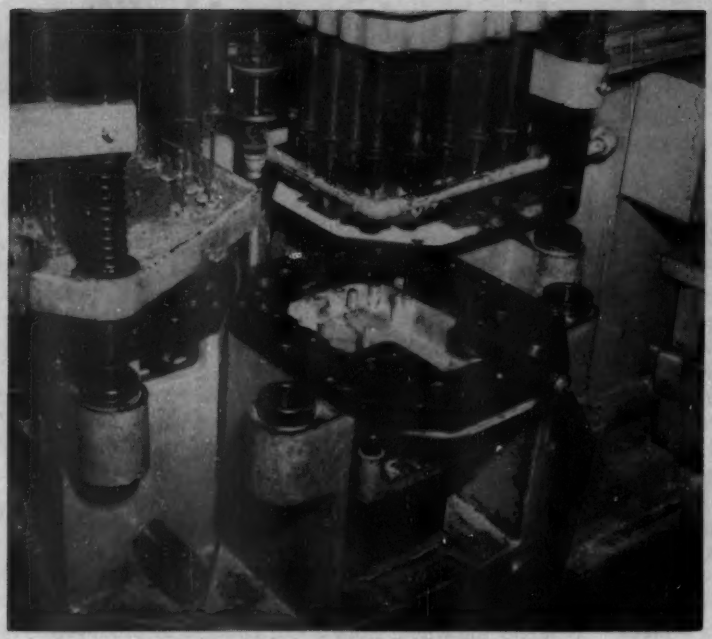
FOUR SPINDLES WORK ROUGH CASTINGS on Ingersoll milling machine fitted with Ohio rotary table. Indexing pins lock table at 90° intervals so work can be rotated, presenting it to roughing and finishing cutters in turn. *De Laval Steam Turbine Co, Trenton, N J.*



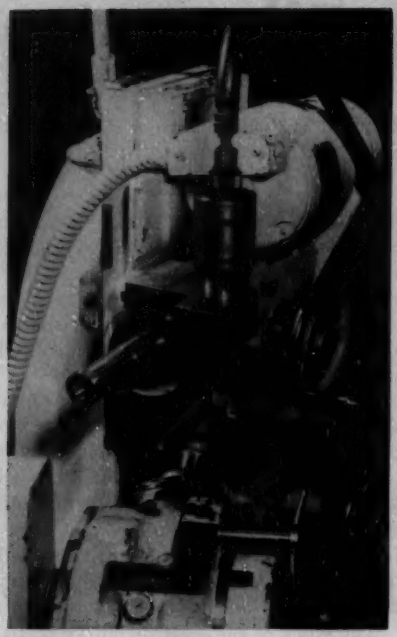
LATHE'S ALIGNMENT IS PRACTICALLY GUARANTEED by dating system that gives quick check on how long since last inspection. All machine tools in shop are inspected and adjusted, if necessary, every three months. Then date is stenciled on red-painted panel. *Nebel Machine Tool Co, Cincinnati.*



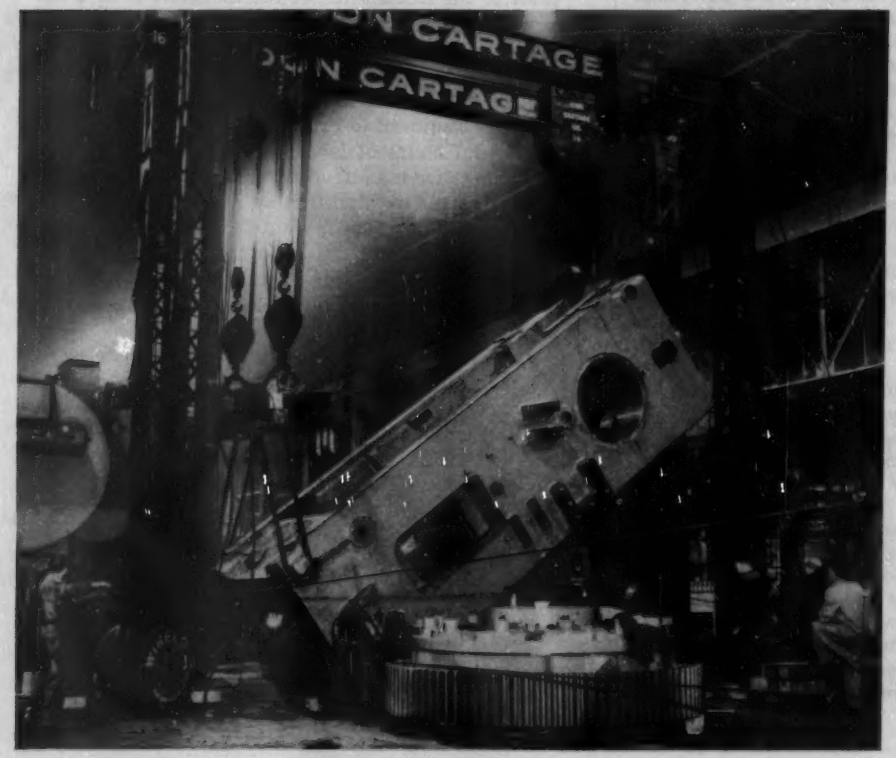
JACKED-UP LATHE BORES HEADSTOCKS AND TAILSTOCKS located on carriage platen, with boring bar guided by two supports. Distance from platen top to spindle centerline on the 27-in. machine was 10 in.; is now 20 in. because of heavy inserts under headstock and tailstock. *Nebel Machine Tool Co, Cincinnati.*



BOX FIXTURE LOCATES THIN-WALL MAGNESIUM CASTINGS when 16 fastening holes are drilled and tapped around flange. Four-station indexing machine at McCullough Motors is loaded at station 1, drills at 2, flushes out chips at 3, and taps at 4. Spring stop under top plate provides 32-lb uniform side pressure against 0.090-in. wall of die casting when standard raising clamps are operated. *Vlier Engineering, Inc, Los Angeles.*



ADAPTED GRINDER SHAPES HELIX AND RAKE on tapered end mills with air-driven grinder spindle set up vertically. Air grinder is clamped to main spindle, and can swivel parallel to it. Cutters can be resharpened eight times when dressed this way, instead of only two. Savings are about $4000 a year. *Chance Vought Aircraft, Dallas, Tex.*



FORGING PRESS GOING UP —to fill out a battery of three that will supply crankshafts for complete Chrysler line. The 6000-ton mechanical presses will make shafts two to three times as fast as other methods. *Chrysler Corp, Detroit.*

"We cut production time 27%...

ROBERT S JONES, manager of manufacturing, JONES & LAMSON MACHINE CO, SPRINGFIELD, VT

From the start in the milling department in 1945, incentive coverage has been extended to cover all hourly paid and salaried people in the company. At present there is an incentive plan for everyone and coverage is 90%—probably more coverage than in any plant except those with an over-all bonus type of incentive.

Some of the jobs covered, other than direct work, are truckers, millwrights, sweepers, tool designers, process engineers, leadmen, and foremen. As incentive plans were built to cover more and more jobs, inevitably it became more difficult to figure out. At the tag end there were a few that were really tough. In some of these latter plans, cost reductions have not been large, but we have maintained the principle that we pay extra only for extra work.

The work of building incentive plans has been expensive. Maintenance of these plans is and will be expensive. A change in organization, plant layout, or methods usually results in the need to revise some incentive plan. The time required to figure the earnings each week costs money. In spite of the expense, we are glad we decided to install incentives. We are sure that they have paid off and that we operate better for having them. However, from the very beginning it has been recognized as fundamental that the incentives must be soundly based, carefully set, adequately maintained, and consistently administered. An incentive plan which does not meet these requirements may be worse than useless.

About the company . . .

Jones & Lamson is primarily a maker of machine tools (turret lathes, semi-automatic lathes, and thread grinders), but also produces optical comparaters, die heads, and chasers. Lot sizes average 35 pieces, but about 15% of the work is on special items made to customer specifications in one- or two-piece lots. Thus the plant is more of a job shop than a production shop. Machines in the plant range from large planers and boring mills to small surface grinders and lens-polishing machines. There are 1500 employees.

. . . and the program background

In the mid 1930's it was decided that time values should be established for each machining operation. These times were established on the basis of data sheets built up from both time studies and the judgment of experienced men. These times were primarily for cost and control purposes. Records were kept of each man's performance against these standards.

Later an industrial-engineering firm studied the possibility of using these times for incentive application, found they were not sufficiently accurate. J & L began to build up standard data from time studies taken in its own plant during the early 1940's.

In contract negotiations with the union in September, 1945, it was agreed that incentive plans would be established for all employees, direct and indirect. Incentives were to be on an individual basis wherever practical. Expected normal earnings were to be 30% above the job rate. The plan was to pay off on a one-to-one basis, the man receiving full pay for time saved above the established standard.

HOW MUCH INCREASED PRODUCTIVITY?

It seems impossible to find any one index that gives the whole story about changes in productivity. However, we have approached the problem from several angles. Studies made from production records are backed up by studies by our own controller and independent auditors.

Performance of Operators—In our plan the standards are set in terms of a 60 performance being 60 minutes of standard work produced in an hour. Just prior to the installation of the incentive plan a survey showed that the average performance on direct work was about 37. All direct workers are currently averaging about a 70 performance and we have been higher, and expect to be again soon.

Hours Required to Produce a Unit—If we compare the actual hours of labor going into several of the basic units we manufacture, on which design has remained stable, we find that we now make these units in 27% less hours than we did prior to the installation of incentives. It is important to note that this reduction includes both direct and indirect hours. Often incentives on direct cause an increase in indirect hours which offsets the savings.

Hours Required to Produce $100 of Sales—If we adjust shipping dollars to compensate for price changes, we find that the hours required to produce $100 of shipments were 25% less in the years 1948 through 1952 than they were in 1942 to 1946. Again, hours used are total shop hours.

It is important to note that while our company was showing an increase of over 25% in productivity, the machine industry as a whole was reporting no significant improvement.

The addition of new machines to our shop, which would affect productivity, was at a slow rate during the six years after the introduction of incentives. The additions had been made at a more rapid rate in the preceding six years.

Certainly there were costs involved in the installa-

. . . with wage incentives at Jones & Lamson. We did it by applying incentives (on an individual basis wherever possible) to both direct and indirect labor, to both hourly and salaried employees. The gains came not so much from increased speed as from increased efficiency."

tion and operation of the incentive plan which offset some of the savings. The cost of consultants hired, time-study men working, and incentive premiums paid amounted to about 30% of the savings realized. In the future, this should be less, for there will be fewer new applications than in the past.

In addition to the gains in improved efficiency, our employees have increased their take-home pay about 30%. This, in turn, has placed us in an advantageous hiring position. Men who really want to work hire out where their efforts are rewarded.

EXAMPLE: JET-BLADE GRINDER

With the advent of the jet engine, our company designed a large special machine to do some of the grinding of the turbine blades required. The average assembly time for the first eight of these machines was 1175 hours each. A methods study had been made after the assembly of the 6th machine and the time for the 7th and 8th was about 800 hours. However, when all parts of this assembly were put on an individually applied incentive basis, the standard time was set at 370 hours and the assembly men managed to earn about 25% bonus working against that standard. We assembled 28 of these machines in 1952, and the savings in direct labor alone resulting from incentive application were more than $19,000.

Incentive plans must be based on standards carefully set and properly maintained. Laxity in following up changed conditions with proper adjustment of standards or in consistency in applying policies concerning incentives will eventually destroy the value of any plan. Many companies have found to their sorrow how expensive it can be to have incentives which are not sound in their basis or were not kept up to date. We presently have 42 men working on time study in a plant with 1500 people.

When considering incentives, many people think only of an increase in the speed at which people are expected to work. This is only one of many effects of incentive application, and it may be among the least important. More notable gains include improved methods, better work habits, and eliminated delays.

METHODS REVIEW

Before a reliable time study can be made, the method of doing the job must be studied. It is necessary to clarify exactly what work is to be performed. The way the work is to be done must be clearly defined. If a machine is involved, the best operating speeds and feeds must be established.

Methods studies must be done with extreme thoroughness prior to setting standards, for if the possible improvements are not discovered then, the workers will find them later, as they strive to increase their earnings. This the time-study man knows, and it puts pressure on him to be alert as he reviews each job.

This methods review extends to indirect jobs as well as machine operations. In studying a clerical job, for instance, the work to be done must be clearly defined. The procedures for performing the work must be written out. Any unnecessary steps must be excluded from the standard, for you can be sure such work will be dropped after application of the incentive.

When we came to establish a standard for the timekeepers, there were 25 people on this type of work. As the result of a methods study the timekeeper's desks were redesigned, new time tickets were introduced, and new work centers were set up. These moves enabled a timekeeper to service two or three departments instead of one. After incentives were installed the number of timekeepers was rereduced from 25 to 11. The saving to the company was about $55,000 a year.

IMPROVED WORK HABITS

After the job is defined and the way it is to be done is determined, a measure of the work performed must be established. The method used to set the standard will depend on the type of work. Here consistency and accuracy are a must. An attempt to save money by doing less than a really good job may doom the incentive plan to eventual failure before it is well started.

It was noted before that an increase in the speed with which people work when incentives are applied is not a major factor in the results obtained. In our case we noted that even though the average operator's performance prior to the incentive plan was only a 37, the men were actually rated at over a 60 when they were working. It was the wasted time that pulled them down.

Incentive application attacks this lost time in two main ways. The first is the effect on the man himself. While he may not work much faster, he works much more steadily. He realizes that a visit with the man on the next machine about last weekend's hunting trip is costing him about 3¢ a minute.

ELIMINATION OF DELAYS

When a man starts on incentive, we tell him that he should be working against his time job only when he is actually performing work covered by the standard for the job. When he encounters a non-standard condition, he is expected to charge his time to the

code set up for that condition. The time clerk keeps a record for each man of jobs he runs and the time he spends on those jobs or on non-standard work. Codes have been established for such items as waiting, tooling delays, salvage work, trucking, and clean-up. Each of these codes is broken down into several categories.

The workers are, of course, interested in "punching out" when they encounter non-standard conditions. The proper charge is assured as they must obtain the foreman's approval. This segregation of costs had been in effect prior to incentive application, but there was no real urge to properly separate the direct work from the indirect. As soon as the first department got started with incentive coverage we found surprising things. We had thought our jigs and fixtures were in good shape, but no one had done anything about it. Foremen or men remembered that a fixture was off, but worked all right if a 0.015-in. shim went under the right-rear corner. A drill jig might be so worn that each piece put into it had to be set with an indicator. On a day-work basis a man would just as soon set pieces in a jig with an indicator as drill holes, but on standard there was no allowance for that extra work. The man said, "I've got to be off standard." The foreman said, "There is more indirect charged against me. I won't run the job until the jig is repaired." (Soon the toolroom foreman was saying "I can't keep up with all these repairs. I've got to have a bigger department.")

We found some places where men were often waiting to get their work inspected. More inspectors, or a reassignment of those we had, were necessary.

Some machines were in poor repair. The specified speeds and feeds couldn't be run successfully, or accuracy couldn't be held. This put pressure on the maintenance department.

Men lost time because work storage was poor and they couldn't find the next job. They lost time because the foremen didn't line up the jobs ahead. They complained that the tool-crib service was slow. There weren't enough plug gages of certain sizes, so that men had to swap one gage between two jobs. Specifications weren't clear on some jobs and time was lost looking them up. Some cutters weren't ground properly and had to be returned for rework.

These were not new troubles. They had been with us for years. This was not in a backward, rundown shop. Our company was a leader in installing good equipment. We had been working for several years on a measured day-work system. We had thought, and with some reason, that, compared to many others, we had a good manufacturing operation.

Each week the accounting department showed us a breakdown of the lost time in each department. We knew from this where to direct our efforts to make improvements—and knew when improvement had been made.

Sometimes our efforts to improve one condition turned up other problems which needed correction. In seeking the reason for the lost time charged to improperly ground cutters, we studied the cutter-grinding operation. We found there a group of experienced men, each doing in his own way what seemed like a competent job. However, the specifications to which cutters were to be ground needed to be standardized. The inspection of the cutters needed improvement. An investigation of grinding wheels led to selection of the best grade for each job. The grinding methods were studied, as were proper grinding speeds. When this was completed and incentive applied on the cutter-grinding work, large savings were made. For instance, the time for grinding a spiral slab mill was reduced from 36 min to 15 min. The number of men on this work was soon reduced from 22 to 8 with the same work load.

Having operators interested in properly reporting delays which prevented them from doing standard work, and having this lost time reported by departments and in total, gave us a clear picture of our costs. By studies of the problems involved and by application of incentives to the work of service departments, hours in these departments have been reduced in a ratio comparable to the reduction in direct hours. Manufacturing delays have been reduced. Operators in an average machining department stay on standard work 85% of the time now.

IMPROVED OUTPUT PER MACHINE

Reduction in manufacturing delays results in machines being run a larger percentage of the time.

Also, the methods work prior to incentive application includes establishing the speeds and feeds for each machine which best balance cutting time, machine maintenance, safety, and tool cost. Such studies indicate that considerable increases are desirable in a majority of cases. Once these proper cutting rates are set, incentive insures that they will be run. Thus, machines are used much closer to their fullest productive capacity.

The increased drive for quantity soon puts pressure on the maintenance of quality standards. In

Feed Moved Above the Chatter Point

When J & L started studies on milling machines, it was observed that there was no consistency between operators in the feeds they ran on end mills. Observation showed that there was a point at which the tool started to chatter. Experienced operators were aware of this and were using feed rates below that point, but there was no agreement about how far below was best. The time-study department ran some tests on end mills. They found that as feeds were gradually increased a point was reached at which the tool chattered. However, they continued to increase the feeds and soon the chatter disappeared. There was an area beyond the chatter point in which the tool cut just as smoothly as it did at a low feed rate. Further experiments showed that the controlling factor on feed for end mills was cutter deflection as it effected dimensions and not chatter. The standards for cutting with end mills were set at over twice the feed range that had been generally accepted in the trade prior to that time and have run successfully at this level ever since.

How J & L Handles Indirect Incentives:

Machine Repairmen

Machine repairs are divided into about a dozen classifications based on the average time required. Each class lists a number of jobs (such as "remove, repair, and replace milling-machine clutch") that have been time-studied and found to fall in that time class.

The foreman assigns a time class to the job when it is given to the repairman. If, for example, it is a job falling between two and three hours on the time study, standard time would be 2½ hr. If the job is unusually easy it might be finished much more quickly; if the repairman hits a frozen or rusted connection, it might take much longer. No allowance is made for either of these conditions, which average out over a group of jobs. If, however, while doing one job the repairman encounters a different job that should be done, an additional time classification is added by the foreman for the new job. . . . . .

Not every possible repair has been time studied, but enough are listed to serve as an adequate guide to the foreman and others are added as additional time studies are made. Incentive pay is determined on a group basis for all machine repairmen based on actual time in relation to these standard times.

Sweepers

Incentives for sweepers are set on an individual basis. Each sweeper is assigned to a particular foreman (in smaller departments, to two or three foremen). Standards of appearance have been established for each of these areas and standard times for maintaining this appearance. The foreman is responsible for maintaining this standard of appearance in this area. When a sweeper completes his assignment he can, with the foreman's approval, go off standard and be assigned other work.

In practice, a sweeper will have a fairly consistent level of performance and his load will be adjusted accordingly. Thus a sweeper may be assigned 50 standard hours of work that he normally handles in 40 (for which he receives 50-hours pay).

This system replaced an earlier attempt to apply group incentives to sweepers that did not work out well. The new plan has resulted in a much cleaner shop and eliminated the old excuse for poor housekeeping that "the sweepers never get to this department."

Inspectors

Primary basis of incentives for inspectors is quality, with quantity as a secondary factor. Parts are sampled on a quality-control basis in process and again at a "toll-gate" inspection when the completed part is sampled. Formulas have been developed by which the quality of the individual inspector's work is determined from the results of the finished part inspection.

Each inspector starts with a maximum incentive payment. The incentive part of his pay can be reduced or eliminated, on an individual basis, by the modifier derived from the quality of his work (as revealed at the toll gate).

To keep inspectors from taking time to inspect 100% in order to receive maximum incentive, the incentive pay can be modified by a quantity factor on an individual or group basis depending on the number of lots handled by the inspector or inspectors checking the part on the line.

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seeking improvements in inspection, it sometimes becomes evident that engineering specifications need review. Questions arise in areas where there are no standards on which to base consistent answers, and consistency is a necessity with incentives.

With specifications for hand-scraped finishes, for instance, some parts had to be scraped to better fits than others, but there was no way to define the desired results. Time study set up standards of the number of bearing spots per square inch; prepared photographs of acceptable scraped finishes of different types; and with the advice of engineers, set up the quality requirements for each scraped assembly.

With improved standard times and proper charging of indirect costs, the cost information is greatly improved. This, in turn, may lead to improving the pricing of the products.

In a time of declining business, incentives are particularly valuable. The tendency to spread the available work is just about eliminated.

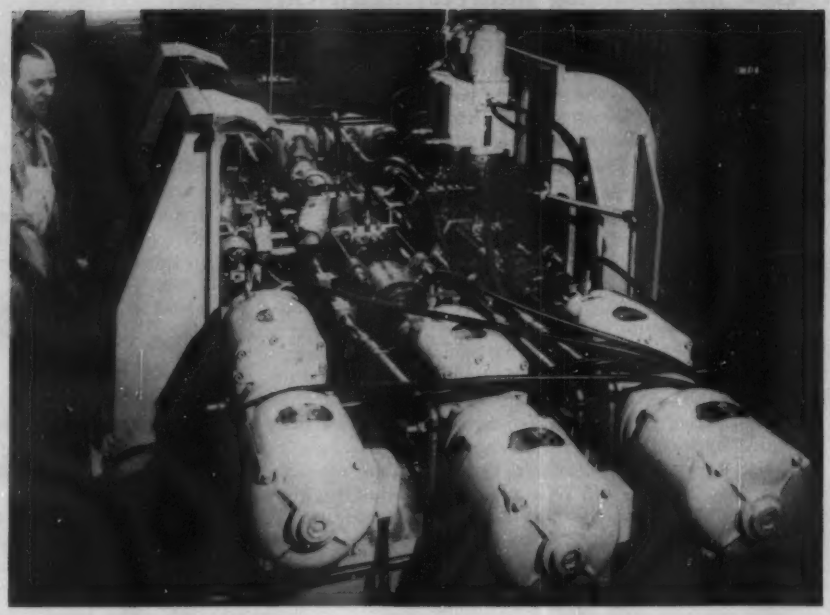
Reducing indirect work proportionately to a fall in direct hours is particularly difficult. With the indirect workers covered by incentives, the places where the work load is low show up at once.

Having accurate standard times provides a dependable basis for evaluating proposed methods changes, or the purchase of a new machine or tool.

In summary, our experience indicates that incentives which are properly set and maintained can result in a considerable increase in productivity. We do not believe that these gains can be by the use of a measured day-work plan, or by an intensive methods-improvement program. It is only when the incentive ingredient is added that these programs take on real vitality.

This increase is not primarily from effect on the people who are covered by incentive, but from improvements which are brought about in all parts of the company operation. Several times people have said, "This incentive is a terrible time waster. Look at all the time supervisors spend answering incentive problems." My answer to that is that most of those so-called incentive problems are questions that should come up whether there was an incentive plan or not. The incentive plan brings them out and forces someone to answer them. It provides a driving force inside an organization that works for continual improvement.

Based in part on a paper presented April 20 at the 9th Annual Time Study and Methods Conference, sponsored by American Society of Mechanical Engineers and Society for Advancement of Management.

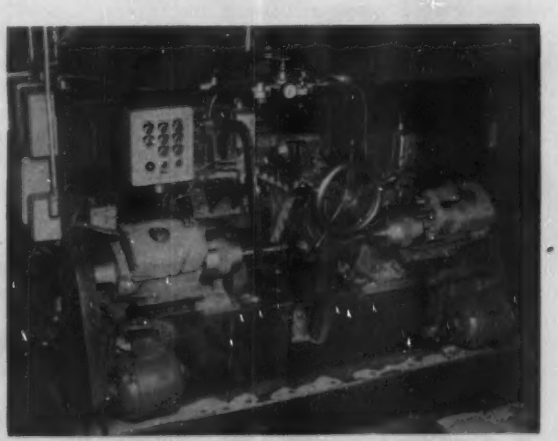


BIG LAYOUT is a sort of transfer machine, made up of eight air-hydraulic units put together by A B Dick Co, Niles, Ill, to machine aluminum cylinders. Parts are drilled, spotfaced, and reamed in two minutes—floor-to-floor time—which is 12 times as fast as earlier methods. Selector switches on control panel will set up any combination of the machine's three positions and eight stations

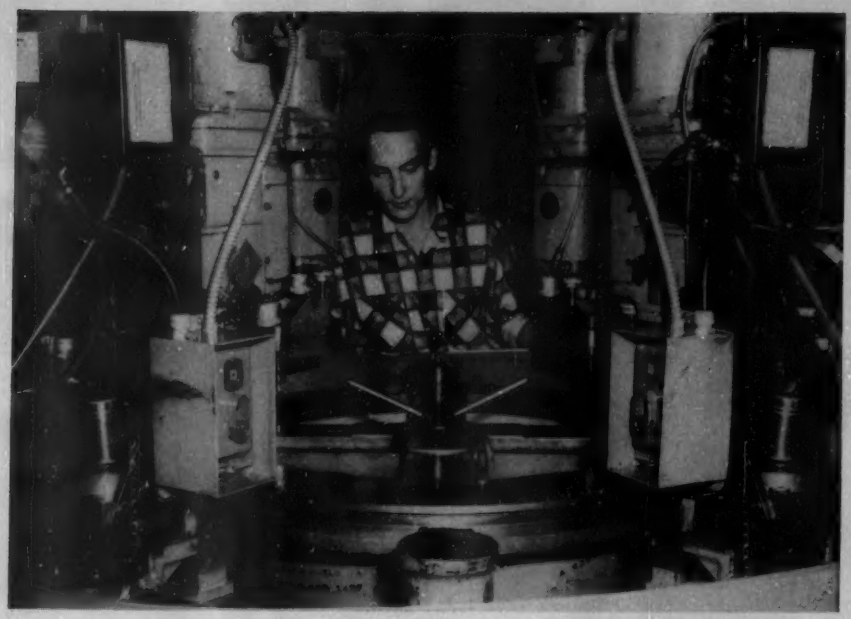
Drill units move tools to work, not

... saving machine expense, fixture costs, materials-handling time, and simplifying setups. These powered packages have controllable rapid advance, rate of feed, length of stroke, and automatic retraction; operated by built-in limit switches that allow remote control. Here are six applications for a variety of metalworking jobs

BOBBING AIR-POWERED MANDREL inside circle of four drill units raises and lowers cartridge containers as 12 holes in three levels of four holes each are cut. Mandrel indexes 45° automatically to stagger hole spacings. The 0.2187-in. holes are drilled at Richmond Mfg Co, Houston, Tex



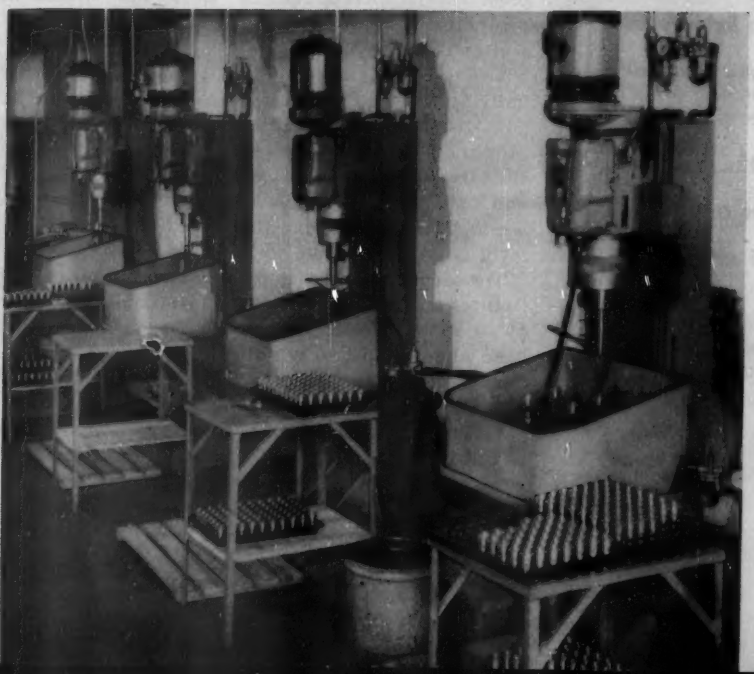
PREDRILLING ATTACHMENT doubles production rate on brass valve plugs at Rockwell. Left-hand drill cuts hole 1 7/16 in. deep, countersinks, and faces plug end; right-hand drill simultaneously hollow-mills two diameters, chamfers, and centerdrills end with box tool; work is indexed to leadscrew spindles where one end is tapped, other is threaded. Three-position fixture turns out 250 pc per hr



VERTICAL UNITS work over indexing table that carries "hot sections" for J-47 jet engines. Setup is at Ryan Aeronautical Co, San Diego, where it was built up from standard air-hydraulic units and other parts. Cycle is semi-automatic; it produces 160 holes in the flange, accurate to 0.010 in. of chordal distance. Tolerances on hole diameters are +0.004, −0.001 in. Shop-built machine beats old time on parts by 40 min

work to tools...

C A WIKEN, VP—engineering & research,
ROCKWELL MFG CO, PITTSBURGH



TWO SWIVELLING DRILL UNITS on machine base can be adjusted for in-line or angular drilling up to 40°. Machine has upped production 110% at Edward Valves, Inc, E Chicago, Ind, where angular port-holes on forged-steel valve bodies are cut. Unit works automatically after work has been loaded, and feed rate, rapid approach, and final depth are adjustable

DRILLPRESS ARRANGEMENT at Richmond Mfg Co takes care of burrs thrown by preceeding operation into central hole. Air-operated tables support four-piece fixtures that are kept loaded by one operator per machine

LIGHTING LEVEL AT WORKING HEIGHT (36 in. above floor) in plant addition is 43 footcandles, and much higher overhead. Workers in old section, which is lighted at conventional levels at working height, complained about poor light when they saw contrast (rear)

Practical "lab"...

A 60x200-ft building addition gave Wakefield the chance to test its own lighting fixtures on a large scale; and to examine prestressed-concrete construction and Fiberglas-panel noise insulation, too. Results of the installation after a year of service show returns in worker comfort and morale that are worth the extra costs to the company

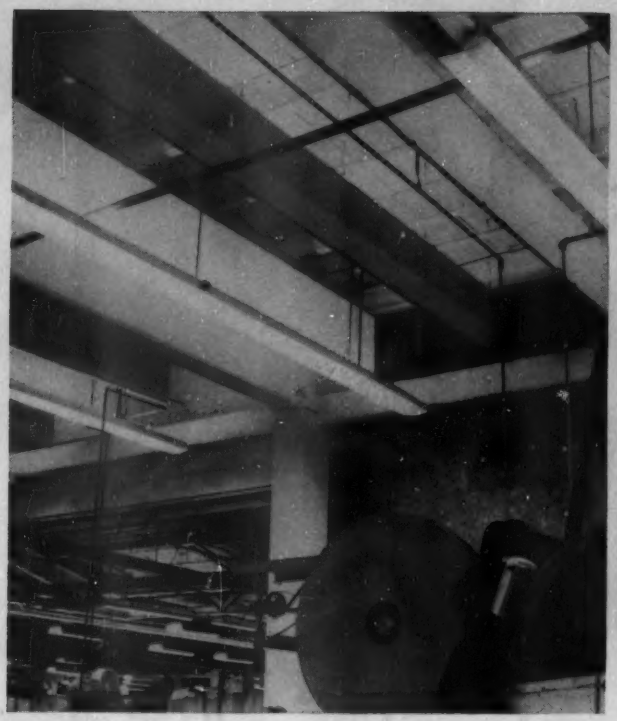
CARL A SCHROEDER, secretary—plant supt;
F W WAKEFIELD BRASS CO, VERMILION, O

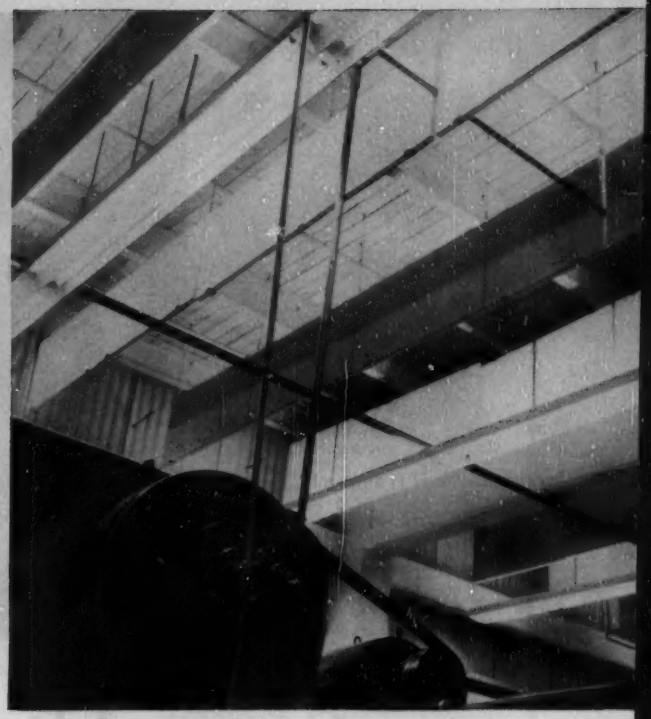
Of the three innovations in the new plant wing, the prestressed-concrete beams were the easiest to evaluate. They do their job in supporting the roof, and do it well.

The lighting is a more difficult factor to tag. Originally installed to produce 43 footcandles, it is based on 8-ft reflectors in continuous rows carrying two Slimline fluorescent lamps (74 watts) per fixture. Half the light is thrown directly down, and half up and to the sides. Walls and ceilings are painted white, with a reflectance of 75%; therefore the light level is good high and low.

Telescoping trucks permit maintenance on the fixtures and lamps, which are cleaned monthly. Cost of the system, which covers 12,000 sq ft, would have been about $5000 if Whitfield had not supplied its own fixtures. Operating cost at 1¢ per kwhr: about $0.27 per hr.

The difference between old plant sections and the new is obvious in the photo, even though lighting at work level in the main plant is considered adequate. Tests with a light meter show the ratio of vertical





tests light... and quiet

CONSTRUCTION IS WITH 60-FT PRESTRESSED CONCRETE BEAMS, largest installed by The Austin Co as of 1952 when addition was made. These photos were taken in area that has become pressroom

SOUND LEVEL IS KEPT DOWN by Fiberglas baffles spaced on 4-ft centers aligned between fluorescent lamps. Noise reductions ranged from 2 to 5 decibels, which seems small but has noticeable results in easing talking in the shop

light to horizontal in the old sections is about 2.2; in the new is 1.6. Ideal would be 1.0, which would indicate no shadows; but shadows in the original plant are heavy. The 1.6 reading indicates the advantage of the upward lighting provided by the fixtures.

In the old building, you can't see up past the lights to the ceiling; and to inspect piping you must climb up to the ceiling.

Although the cost of the new lighting is running slightly higher than the old, the company believes the investment well worthwhile.

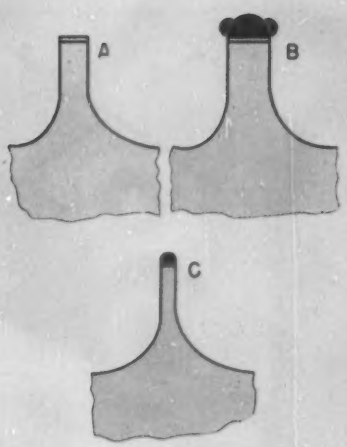
NOISE REDUCTIONS

The new section of the plant is mainly a pressroom, and 20-gage stock is handled. Complaints about the noise were quick to be heard when the machinery had been placed and production started. On the advice of Owens-Corning, one wall of the area was lined with Fiberglas from 5 ft above the floor to the ceiling, and baffles of the material were placed across part of the ceiling on 4-ft centers.

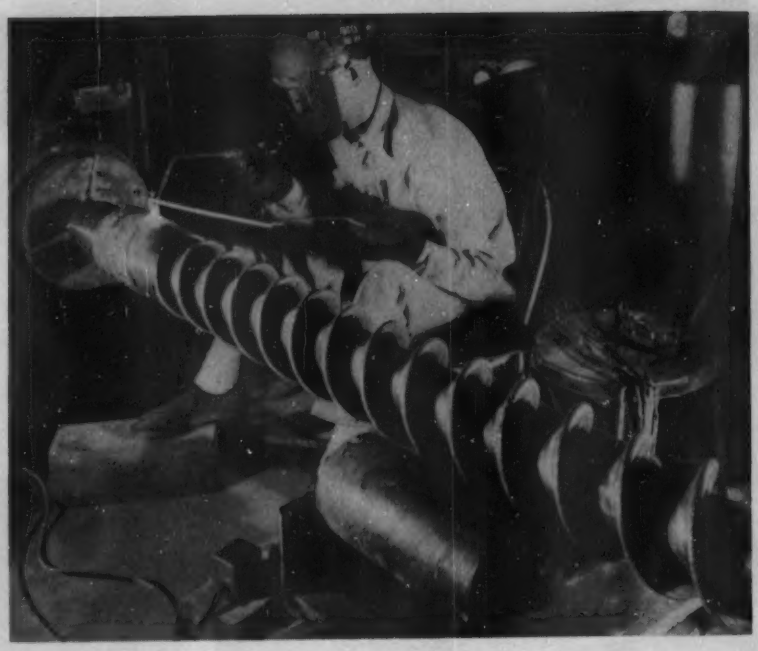
Noise now dies down immediately after a press makes a stroke instead of reverberating as before. Furthemore, background noises in the area have been reduced so that peak noise levels are only slightly louder than the background level in a nearby area where no manufacturing is done. The drop in decibels has been from 2 to 5, which sounds minute but has a real effect on making it possible to talk in the plant.

With the insulation in place between the lighting fixtures, the light level is dropped to 37 fc. This is still a good bit above the average level in factories; yet it indicates the loss due to non-coordinated planning, which might have saved some of the loss. This was because the noise had not been considered when the lighting was planned, and it was only after the installation had been completed that the noise was recognized as a serious problem. Should the lighting and insulation be coordinated on a new job, results would undoubtedly be much better.

In all, several lessons have been learned from the installation, and these will be applied in case of future expansion.



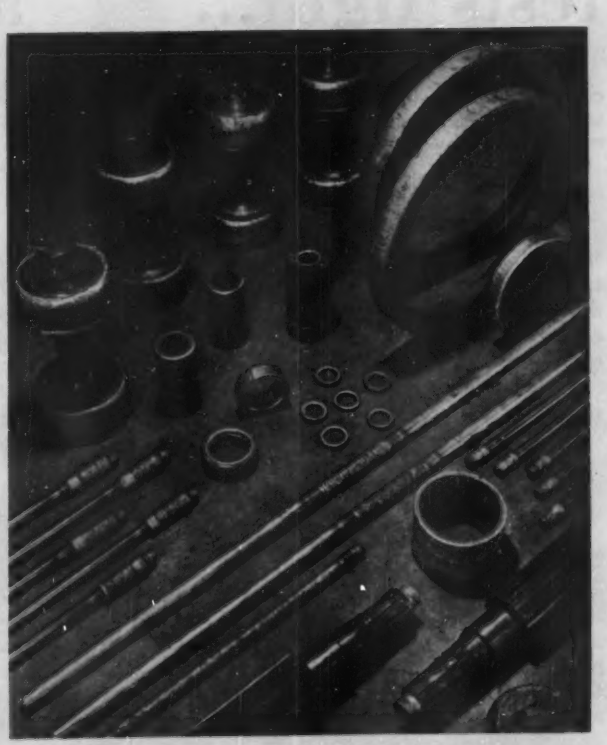
EXTRUSION SCREW IS BUILT UP to an increment of 1/16 to 3/32 in. on the edges of the thread. A square corner is required, as in sketch A, so three beads are made; one heavy central bead, and two light corner beads, as in sketch B. For a thin thread or web, sketch C, a single bead would be enough



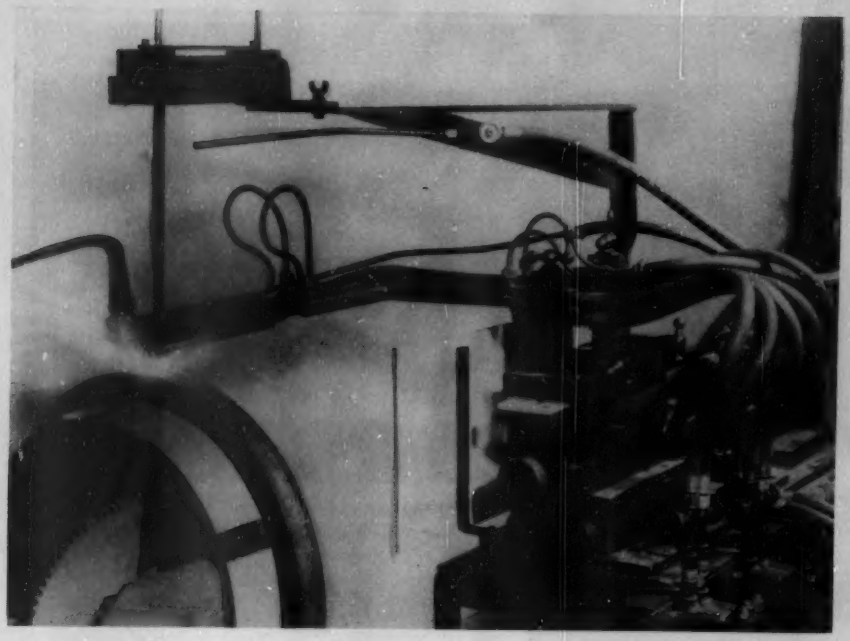
Gas-welding hard surfaces

JOHN WISCHHUSEN, vice-president,
CLEVELAND HARD FACING CO, INC, Cleveland, Ohio

Welding has long been considered a low-cost crude means of repairing worn surfaces; but this concept is no longer entirely accurate. Hard-facing problems now often impose rigid restrictions, and results of using high-alloy materials in the welding rod and of a high degree of operator skill have been facing jobs of unusual quality. Here are examples, and how they were done . . .

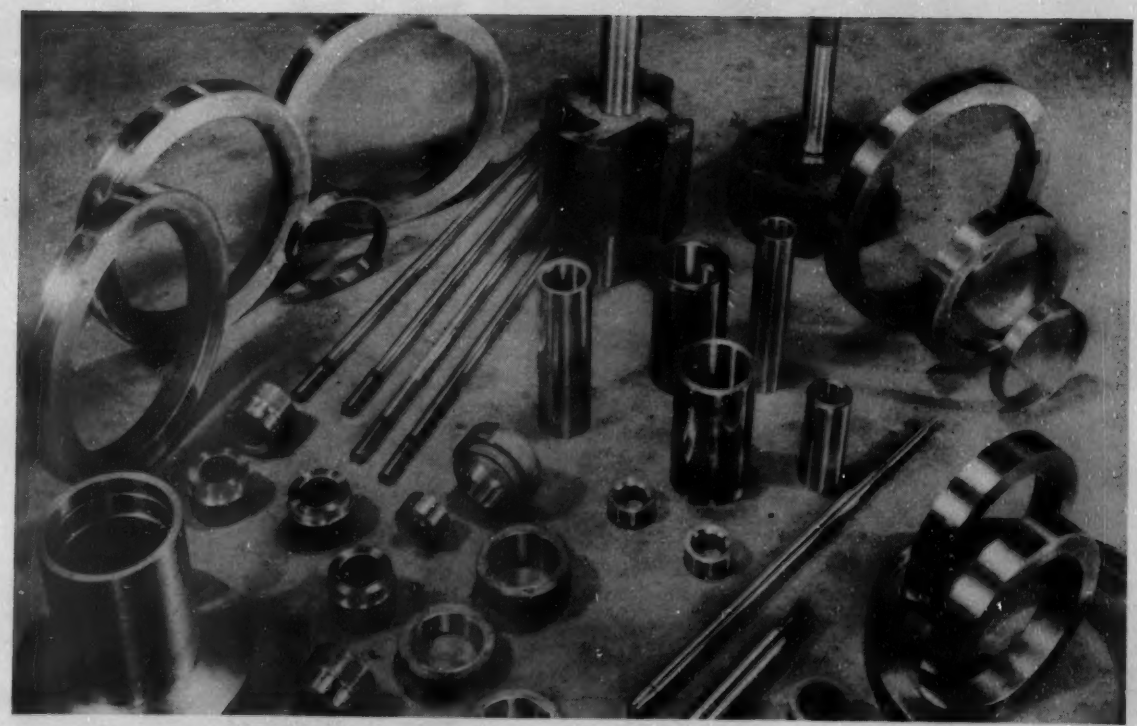


Typical hard-faced parts in



MECHANIZED HARD SURFACING is done with multi-jet gas heater, automatic rod feed from directly above work, and motor-driven workpiece. Process is sufficiently reliable to allow working out feeds and speeds for continuous operation

for precision



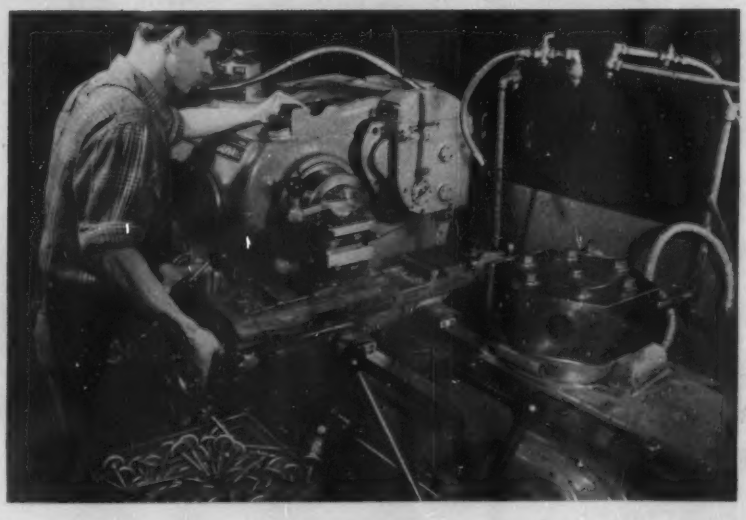
as-welded condition (left) and machined (above)

GAS-WELDING HARD SURFACES

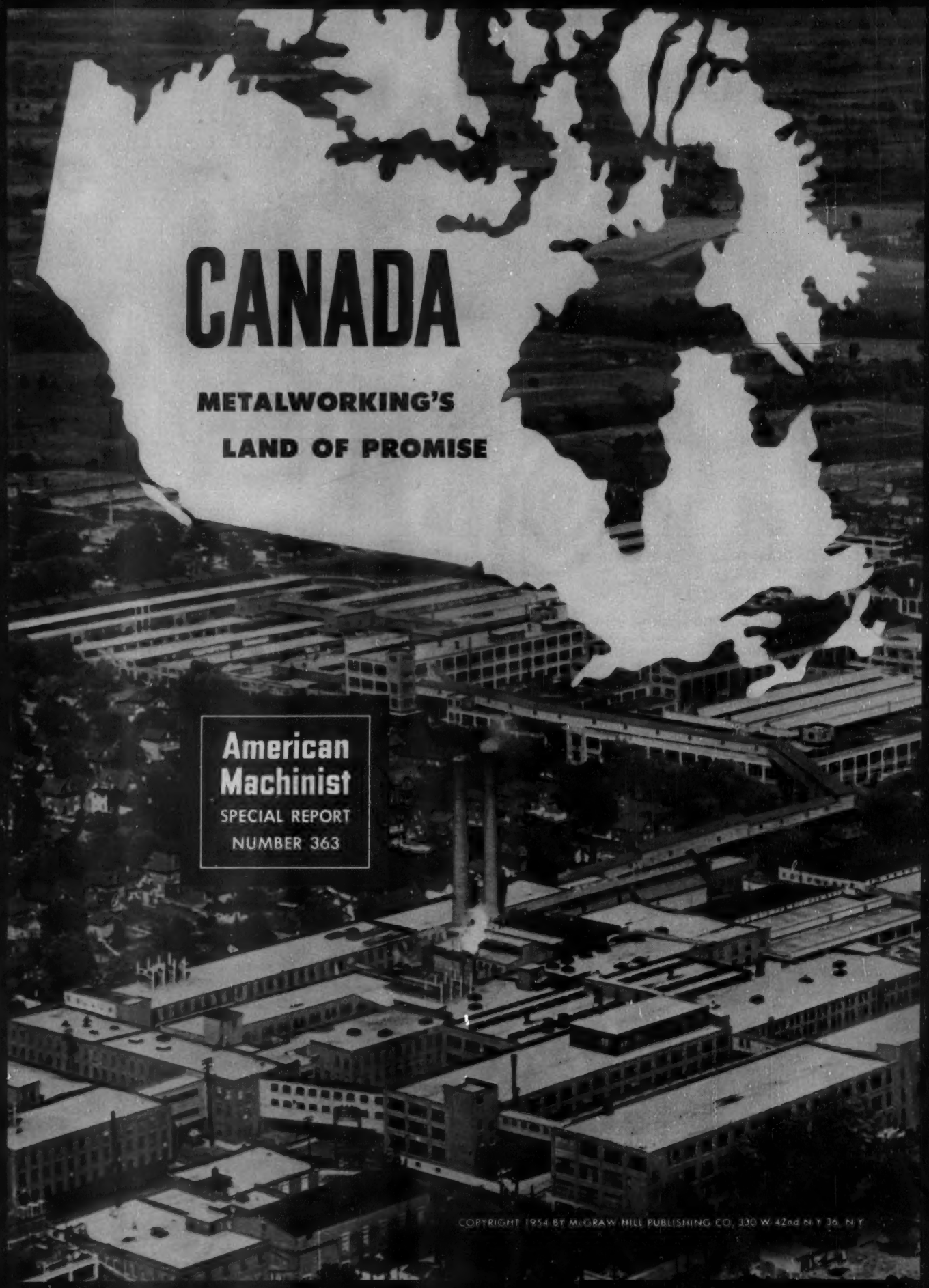
continued

PARTIAL MECHANIZATION can be done with workpiece rotated by positioning rollers, but with welding being done by hand

MACHINING IS DONE WITH A HEAVY INITIAL CUT to reduce chattering and prevent burnishing action by the tool. Coolants are not recommended unless there is an unusually large amount of machining to do and high surface speeds and form tools are employed. To finish-grind, medium-grit and hardness are preferable for the wheel to provide gradual wheel breakdown and thus avoid glazing from the usual hard alloys



PARTS ARE PREPARED for surfacing by scrubbing with solvents, rubbing with steel wool, wire brushing, or by machining. In the latter case, a rough cut of 1/16 in. is made on areas where dimensions are critical. Then the alloy is built up well above dimensions and machined to approximate size, with allowance for final grinding, as explained above. Machining will reveal pits, low spots, cracks, or other imperfections, permitting correction before grinding



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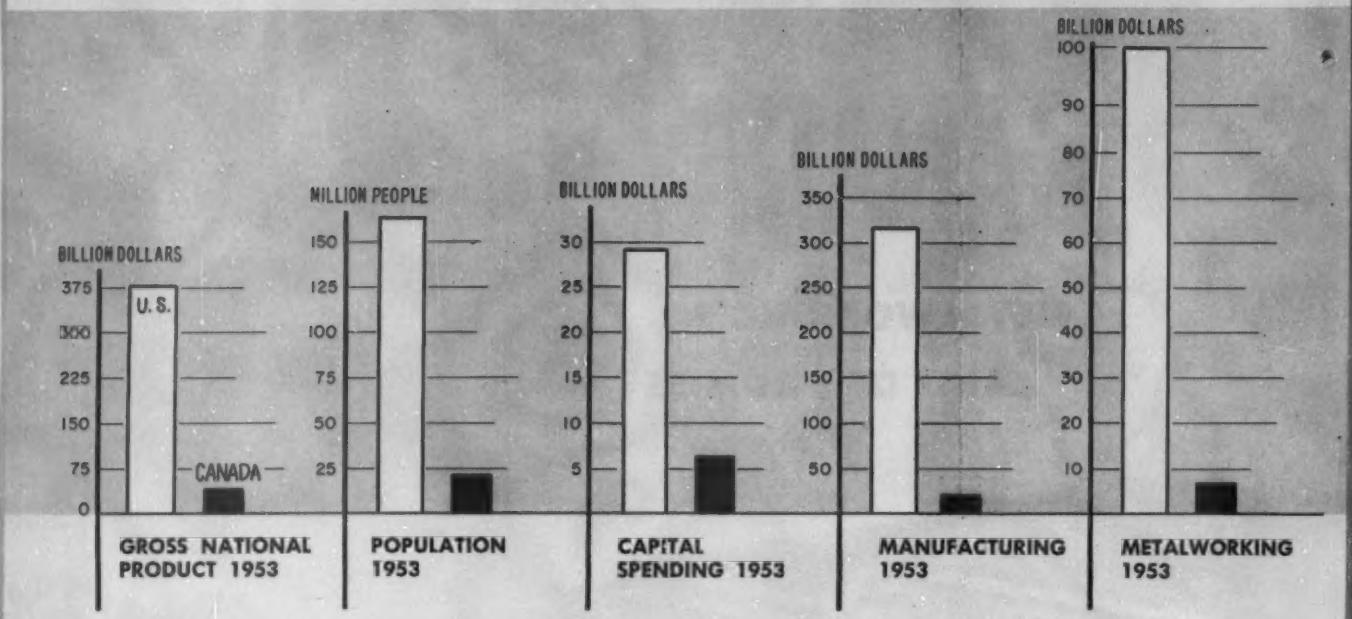
CANADA...

its per-capita output is less than ours...



COMPARISON OF US AND CANADIAN INDUSTRY must take into account the relative populations of the two countries. Canada is greater in area than the United States, but its population is roughly only 1/11 that of the US's 161 million. But even on this basis, Canada lags behind the US in gross national product, its total of $24 billion in 1953 being roughly 1/15 of the United State's $367 billion. Last year, Canadian manufacturers shipped $18 billion worth of goods, roughly 1/17 of US $300 billion shipments in 1953. Metalworking shipments in Canada hit a new high of $4 billion in 1953, but were still only about 1/25 of US $100 billion shipments. But Canada's bright future is indicated by its $6½ billion investment in capital goods in 1953, almost ¼ that of the US

Manufacturing output has more than

Canada today is almost universally regarded as the coming nation in Metalworking. This was particularly evident last year, when the Canadian International Trade Fair at Toronto bulged with exhibits of machine tools from a dozen or more countries. And this year, faith in Canada's metalworking upsurge will be even more evident when machine tools again will dominate the Fair.

Why is world Metalworking interest focused on our neighbor to the north?

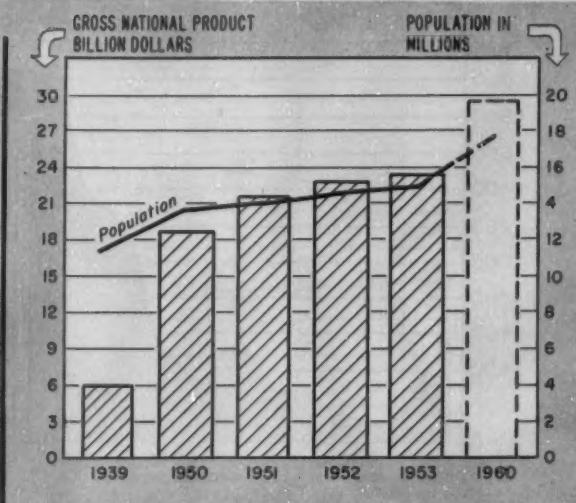
To find the answer, you need only travel along the Queen Elizabeth Way from Toronto to Hamilton, a distance of some 40 miles.

Along this stretch are scores of new metalworking plants, with ground being broken for new industries almost daily. This is Canada's "Golden Crescent," her entry in the race for world industrial supremacy. Someday soon, say the Canadians, the Golden Crescent will rival and possibly outproduce England's highly industrialized Midlands. And some think the Crescent may one day be a formidable competitor for the United States' Detroit-Cleveland-Buffalo lakefront industrial axis.

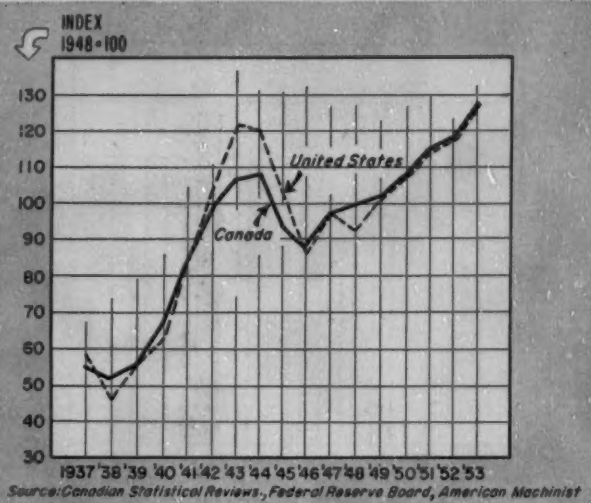
And there's plenty of justification for Canadian optimism. In the Toronto area alone, there are more than 400 US-controlled manufacturing plants. That's only the beginning — traveling westward from Toronto to Hamilton, you'll find plants of many US automakers — General Motors at Oshawa, Ford at Oakville, Studebaker at Hamilton, Nash and Reo just outside Toronto. And along the Crescent, you'll find the parts and accessory makers who cater to the auto industry.

Other industries are springing up thick and fast in the Toronto area. There's Volkswagen of Germany, planning to build an auto assembly and parts plant. There's Britain's G A Harvey & Co, Ltd, metal furniture makers, and G Dikkers & Co of The Netherlands, reported ready to build a valve plant for the oil industry.

...will be greater one day soon



CANADIAN GROSS NATIONAL PRODUCT IN RELATION TO POPULATION



COMPARATIVE INDUSTRIAL PRODUCTION CANADA AND THE UNITED STATES

CANADA'S RAPID INDUSTRIAL GROWTH IN RECENT YEARS has revolutionized its national economy. For years primarily an agrarian nation and a source of raw materials, Canada today is the world's sixth-ranking industrial nation, and it is the fastest growing. Economists say that Canada today is in the same position as the United States was in the early 1900's — the era of greatest US industrial expansion. And Canada in the 1950's doesn't have to face the same problems the US did in the 1900's. Machinery and power are available today that were undreamed of 50 years ago. From the charts above it is evident that Canadian output can easily cope with a rapidly increasing population. And it is also evident that Canada is keeping pace with the world-leading USA

doubled since pre-war years

At Scarborough, outside Toronto, the "Golden Mile" at the eastern limits of the Golden Crescent, Canada's fast expansion in Metalworking and other industries has assumed mushroom proportions. Here, in one intensely concentrated area, are US branch plants of Link-Belt Co, GM's Frigidaire Division, Acme Steel Co, plus Rootes Motors of Britain and many US, Canadian, and foreign metalworking firms.

This is the Toronto area, hub of a third of Canada's national market and site of over half the nation's manufacturing industries.

At the other end of the Golden Crescent, Hamilton, steel capital of Canada, is fast expanding eastward to meet Toronto's spreading industry. Hamilton, too, is top-heavy with US, British, and foreign heavy industry, including Westinghouse, International Harvester, Studebaker, Dominion Foundries & Steel Ltd, and Steel Co of Canada Ltd — to name just a few metalworking giants.

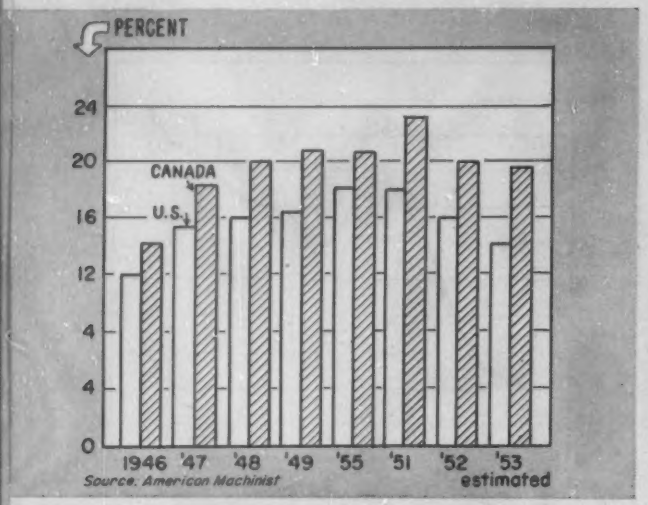
Hamilton is also the heart of Canada's aviation industry, with A V Roe's new huge jet-engine plant and other plane-building facilities, and those of England's de Havilland located at nearby Malton. These two firms and other Canadian planemakers are today turning out an impressive number of US-designed fighter planes for Canada's mother country, Britain. And they're producing some of the world's most advanced jet-plane designs.

New aircraft will get the lion's share, $400 million, of Canada's 1954-55 $2-billion defense budget. Balance of the defense appropriation will be divided between tanks and armored vehicles ($26 million), new buildings ($172.5 million), and new ships ($93 million). Like the US defense budget, Canadian appropriations dropped sharply with the end of the shooting war in Korea.

Canada's Golden Crescent is the area in which materials, labor, and markets combine with water, rail, and air transport to form the industrial capital of Canada.

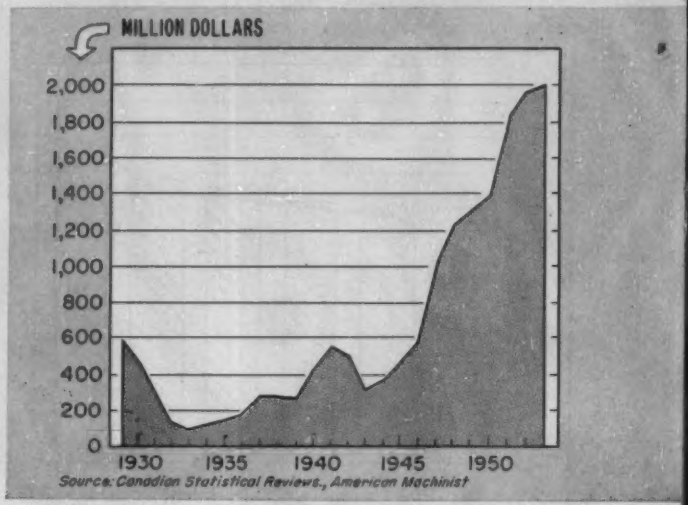
CANADA...

Recent investment in plant and



CANADA-US INVESTMENT/PRODUCTION

CANADA HAS LED THE US IN POSTWAR YEARS in its ratio of investment to Gross National Product. This means that Canada is reinvesting a greater share of its national income to build up its manufacturing capacity. In turn, the increased future output of Canadian industry will help the country to fulfil the needs of a fast-growing population, and to export more manufactured goods



CANADIAN PLANT INVESTMENT

than it now does. Expansion of manufacturing capacity has been particularly strong in toolmaking, electrical machinery, instruments, aircraft, ordnance, and shipbuilding. But it must be noted that while Canada has invested relatively more in plant and plant equipment than the United States in recent years, a large amount of the expansion money comes from US investment

But Canada is expanding industrially in many other regions, too. For one thing, metalworking industries are springing up around Canada's great ferrous and non-ferrous ore centers, such as the immense iron-ore deposits recently discovered in Labrador.

Windsor, Ontario, has taken on some of the overflowing auto production of its neighbor across the border, Detroit, to become Canada's auto capital.

The Big Three of autodom are here, too — Ford, GM, and Chrysler — and along with them are scores of major auto-industry contractors: Bendix, Auto Specialties Mfg Co, Essex Wire Corp, Gotfredson, Kelsey Wheel Co Ltd, Motor Products Corp, L A Young, and many others. Besides these such top metalworking firms as Canadian Bridge Co, Truscon Steel Co, Dominion Forge & Stamping, and Walker Metal Products Ltd are located in Windsor.

And far to the West, at Regina in Saskatchewan, both Ford and Chrysler are building huge assembly and parts plants. These same two US firms are also planning to expand their distribution and parts plants back East in Montreal.

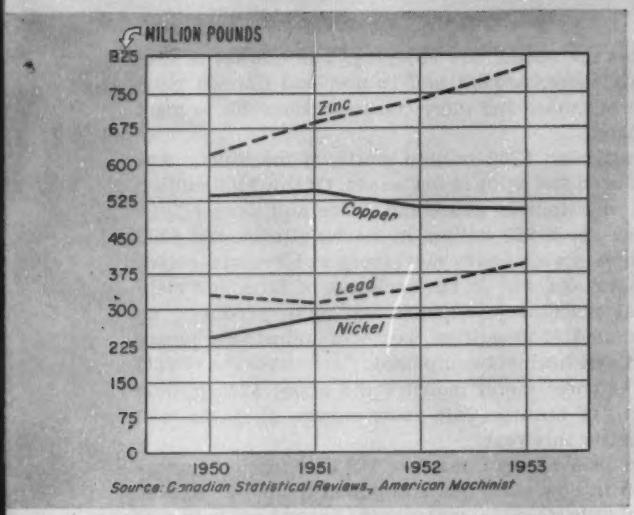
While industrial growth in Canada has mushroomed in recent years, this growth has been one of balance. It hasn't centered in any one industry or in any one area, so that while you find great industrial areas along the north shore of Lake Ontario and in Southern Quebec, you also find that the Prairies, Labrador, Newfoundland, and British Columbia have added their share of fast-growing industry.

Canada until very recently had always been an agrarian nation. That no longer holds true. In all but two of Canada's nine provinces, Alberta and Saskatchewan — heart of the Prairie farmlands, manufacturing outpaced all other industries. This holds true even in the Maritime provinces of Newfoundland and Nova Scotia, where the traditional fishing industry ran a poor second to manufacturing. And in far western British Columbia, center of Canada's logging industry, manufacturing income almost quadrupled income from forestry.

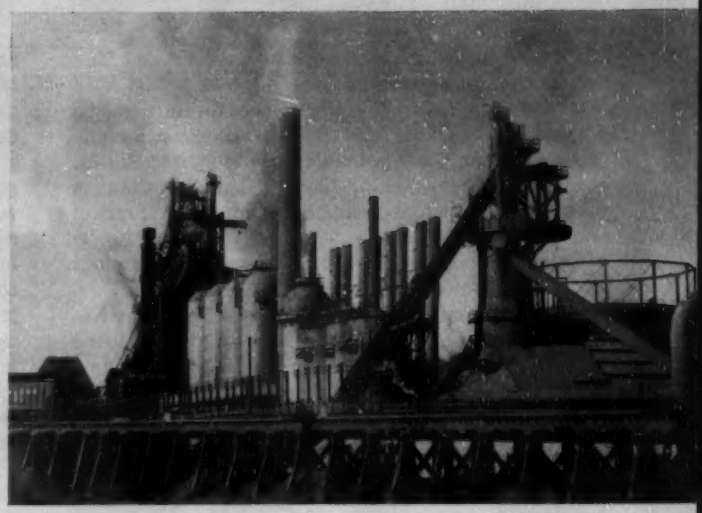
US capital and US management play a big role in Canadian metalworking, with more and more US companies establishing branch firms in Canada, spread over a wide variety of metalworking products. And the United States is not alone in its willingness to invest in Canadian metalworking. The British, too, have gone at the job in a big way. And so have the Germans, who with their keen perception for future markets, have set up 27 branch plants in Canada.

Why do US and foreign industrialists regard Can-

equipment is starting to pay off...

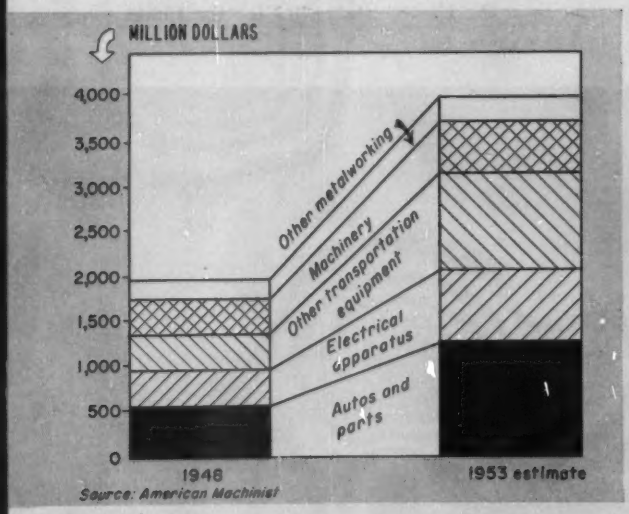


Source: Canadian Statistical Reviews, American Machinist

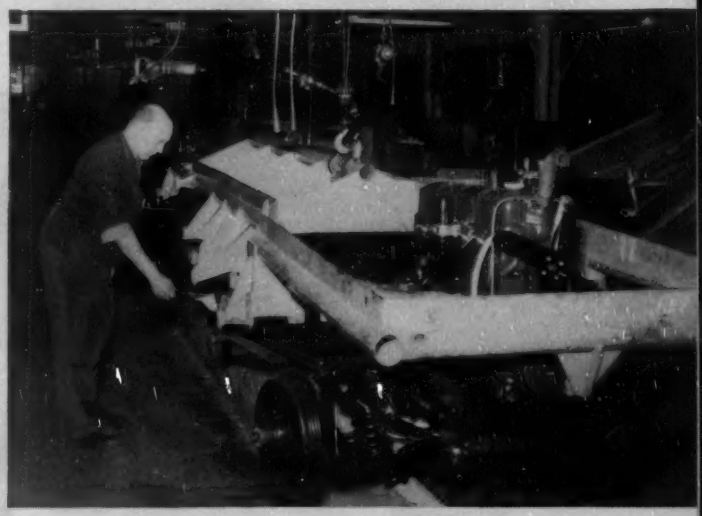


...in primary metals output

CANADA IS FABULOUSLY RICH IN MINERALS — both ferrous and non-ferrous metals. New iron ore deposits are discovered almost every week. And 1953 saw Canadian production of 500-million lb of copper, 800-million lb of zinc, and 400-million lb of lead. Despite rapid expansion in recent years of steel production facilities, and a 1953 output of 4.2 million tons, steel is a limiting factor in expansion



Source: American Machinist



...and in metalworking products

TREMENDOUS GROWTH IN THE LAST FIVE YEARS keynotes Canadian metalworking. Shipments of automobiles and transportation equipment, electrical apparatus, machinery and metal products have doubled since 1948. Of Canada's 1953 $4 billion metalworking shipments, the auto industry accounted for $1¼ billion; other transportation equipment for $1 billion; electrical apparatus (excluding heavy electrical machinery) for $750 million, machinery for $350 million, and other metalworking for $250 million. US-controlled companies and branch plants are leading the field because of superior technology, may do so for years to come

CANADA...

ada as a blue-chip metalworking investment? The primary reasons are fourfold:

- Canada provides a growing market for hard goods.
- Overseas markets can be served more advantageously from Canada than from the United States.
- In many metalworking lines, a Canadian plant is necessary as a source of supply for aluminum, nickel and other metals.
- Canadian tax laws encourage foreign investment and establishment of branch plants.

Add to these reasons the fact that Canada has a standard of living second only to that of the United States, and the picture of Canada as a vast potential market for durable goods begins to unfold. For example, Canadians last year bought 350,000 passenger cars, over 1-million radio and TV sets, about 250,000 each of refrigerators and washers. And they built themselves upward of 87,000 new housing units.

Those are last year's figures. What about the future market for hard goods? Canada's birthrate is high — 27 per 1000 — and rising steadily. Immigrants are coming in at a rate of 1000 a day. At this rate of growth, it is expected that Canada's population will double itself in less than 50 years.

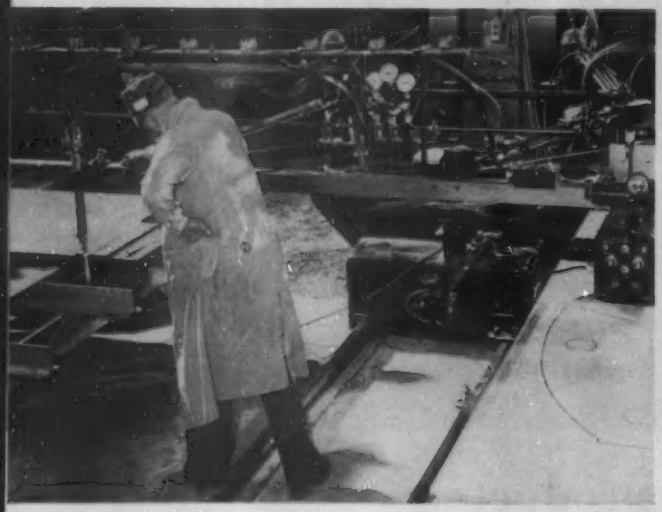
And the Canadians are a "buying" people — they want the same household appliances, good cars and everyday living conveniences that their neighbors across the border are enjoying. The market is certainly there, present and future, and Canada must turn out more and more consumer durables to meet demand.

Last year, $350-million worth of machinery was produced and shipped in Canada. Of this $100 million was in output of household, office and store equipment; about $20 million in machine tools; and $230 million in such heavy machinery as elevators, hoists, compressors, etc. In all, exclusive of farm and electrical machinery, Canada last year produced an estimated $550 million worth of industrial, household and business equipment.

The sheet-metal industry did about $225 million worth of business last year; expects to do as well or better this year.

In 1953 alone, Canadian, US and foreign investment in new plant and equipment totaled $2 billion. Obviously, Canada at this stage cannot produce machine tools and other capital goods in either sufficient variety or quantity to meet the demands of an economy that has snowballed its industrial output nearly 150% since 1939. For this reason, about 45% of Canada's capital goods have been imported from the United States in recent years.

Since the advent of World War II, Canada has invested proportionately more in new plant and equipment than the United States has for the same



Market for metalworking machines from the US...

CANADA MUST LOOK TO OTHER COUNTRIES to supply her with complex machine tools and specialized tooling. The United States is Canada's chief supplier of machine tools and equipment, followed by the United Kingdom, Germany, Switzerland, Italy, Belgium, Sweden, France and Czechoslovakia, in that order. US machine-tool exports to Canada run about 5 to 1 in dollar value over those

...one of the world's most promising machine tool markets

CANADIAN IMPORTS OF MACHINE TOOLS . . .

BY TOOL . . .

	Total Imports				From United States MILLION DOLLARS				From United Kingdom			
	1953	1952	1951	1950	1953	1952	1951	1950	1953	1952	1951	1950
Drilling Machines	9.3	7.6	5.5	4.0	6.3	5.2	4.3	3.1	2.1	1.4	0.9	0.9
Grinding Machines	9.1	8.4	4.9	3.7	6.6	6.3	4.2	3.0	1.3	1.1	0.5	0.4
Lathes	11.4	11.4	8.2	4.2	7.0	7.3	5.9	3.4	3.2	3.2	2.0	0.7
Milling Machines	7.8	6.8	2.8	2.2	5.3	5.5	2.0	1.9	1.0	0.6	0.6	0.3
Planers	0.1	0.5	0.3	0.2	*	0.4	0.2	0.2	0.1	*	*	0.1
Presses	6.1	5.4	5.7	5.5	5.3	4.7	5.2	5.3	0.5	0.5	0.1	*
Rolling Mills	3.6	2.6	1.0	0.9	3.4	2.2	0.9	0.8	0.1	0.3	0.1	*
Shapers and Slotters	2.7	2.0	2.5	1.4	1.9	1.4	1.9	1.2	0.5	0.4	0.4	0.2
All Other	13.5	9.3	7.9	5.8	11.8	8.2	7.1	5.5	1.3	0.7	0.5	0.3
Total Machine Tools	63.6	54.2	38.9	27.9	47.6	41.2	31.9	24.4	10.1	8.4	5.3	3.0

BY COUNTRY . . .

Countries	1953	1952	1951	1950
United States	47.6	41.2	31.9	24.4
United Kingdom	10.1	8.4	5.3	3.0
Germany	2.9	2.2	0.3	0.1
Switzerland	0.9	0.7	0.6	...
Italy	0.7	0.5	0.4	...
Belgium	0.5	0.4	0.1	...
Sweden	0.3	0.3	0.2	0.3
France	0.3	0.2	0.1	...
Czechoslovakia	0.1	0.2	...	...
Others	0.2	0.1	...	0.1
Total	63.6	54.2	38.9	27.9

**Less than $100,000*
Canadian Import Statistics; 1953, Estimates American Machinist

...and from overseas

of the United Kingdom, and about 25 to 1 over German machine tool exports. Canada, however, can produce some types of machine tools and general-purpose equipment. Last year, Canada imported

...is growing in Canada

$63.6 million worth of machine tools in this order of dollar value: lathes, drilling machines, grinding machines, milling machines, presses, shapers and slotters and planers

CANADA...

US-OWNED AUTOMOBILES IN CANADA employ the same modern metalworking methods as their US counterparts. This worker at Ford Co of Canada, just over the border from its parent company in Detroit, drills 96 holes simultaneously with a five-way multiple drill

period. This holds true particularly in toolmaking, manufacture of electrical apparatus and instruments, and in production of aircraft, military vehicles and shipbuilding.

While the United States is Canada's major supplier of capital goods, she is also indirectly — through US branch plants — a major customer for capital goods. US investment in Canada represents about 90% of all foreign-capitalized industry, and at 1953's end was valued at upwards of $6 billion. In 1953 alone, US branch plants in Canada spent over $1 billion in new plant and equipment. US capital today accounts for nearly 20% of the total capital invested in Canadian industry, and for 30% of manufacturing capital.

The Canadian government is optimistic about the future of the metalworking industry in general and the machine-tool industry in particular. A recent survey by Canada's Trade and Commerce Department indicates that while there has been some slackening off as a result of a cutback in Canada's defense program, metalworking production and sales won't be far off the 1953 mark. Any downtrend resulting from defense cutbacks won't be reflected much before 1955 — if then, say Canadian officials.

SEAWAY MAY BOOM WORLD TRADE

And while Canada's defense program is easing off a bit, the country's metalworking and machine-tool industries are looking hopefully toward two big projects expected to get under way late this year or early in 1955. They are the St Lawrence Seaway Project and the Trans-Canada pipeline that will bring natural gas from southern Alberta to eastern Canada north of the Great Lakes. The St Lawrence Seaway Project will involve hydro-electric power and waterway development between the United States and Canada of the 47-mile-long International Rapids stretch of the St Lawrence river, which would permit ocean-going vessels to enter the Great Lakes. This would open up European and world trade for Canadian industry. Plus this, Canadian metalworking would get a tremendous lift from an anticipated boom in shipbuilding.

AUTO COMPANIES EXPANDING

Auto companies also expect to contribute their share toward an upswing this year. Canadian auto plants in first quarter 1954 turned out 81,000 cars, contrasted with 75,000 in the same period last year, which set an all-time record.

And the automobile companies are giving a lift to the capital-goods industry. Last year alone, the US's Big Three (GM, Ford, Chrysler) spent about $125 million on new plant and equipment, and are expanding their plants at Oshawa (GM) and Windsor (Ford and Chrysler) this year. Ford's Oakville, Ont, plant, started in 1952, and now completed, is the largest single plant under one roof in the British Commonwealth.

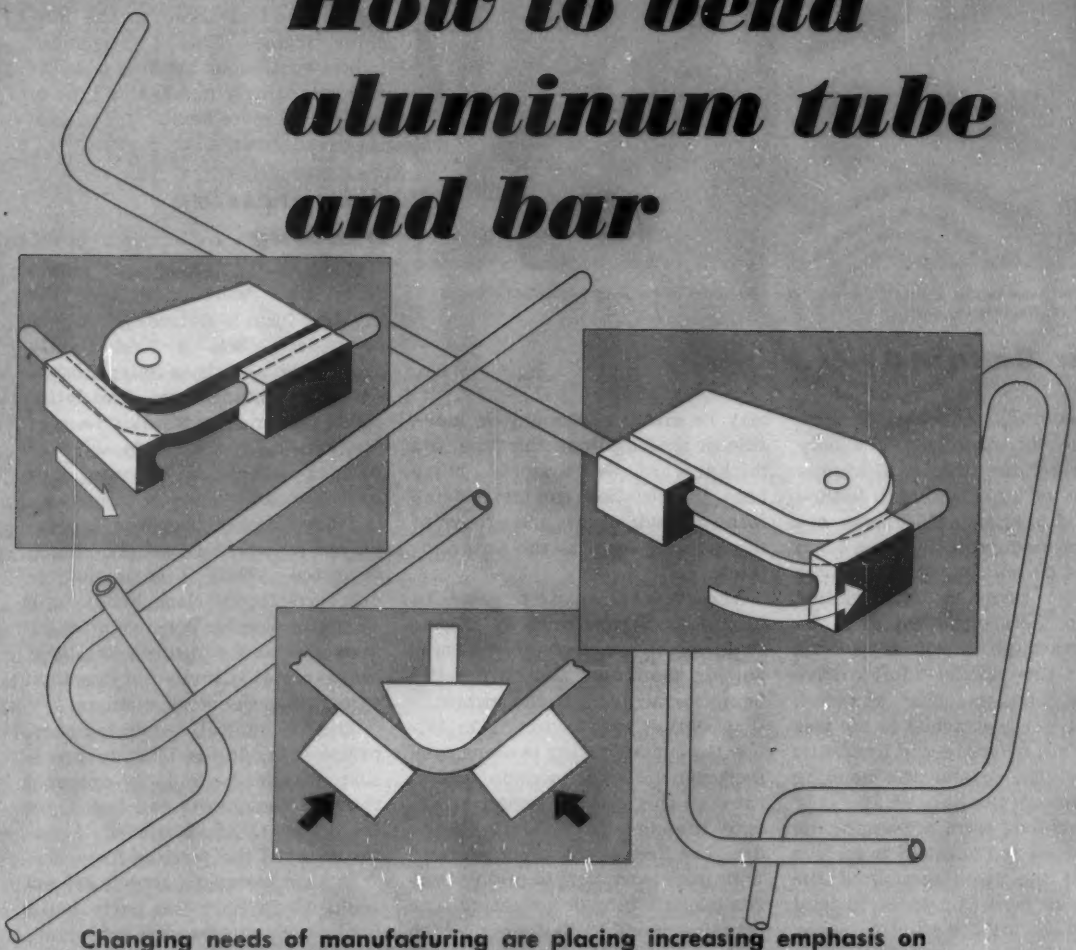
Today, Canadian industry and Canadian metalworking might be said to be "taking a breather" in an era of tremendous expansion. A slight falling off is reported in almost all areas of industrial activity. But this, say the Canadians, is just the lull before the attack on new industrial frontiers.

They point to the tremendous new development of iron-ore mining in Labrador, to the uranium rush, to the St Lawrence Seaway, to giant hydro-electric projects, to increasing participation in world trade, to a growing, buying population, and to liberalized trade between the United States and Canada.

In short, there probably isn't another country in the world with a long-term metalworking outlook as strong as Canada's — an outlook as bright as one of its new-minted dollars (worth $1.02 US).

American Machinist
SPECIAL REPORT
NUMBER 364

How to bend aluminum tube and bar



Changing needs of manufacturing are placing increasing emphasis on bending of aluminum tube, pipe, rod, bar, and structural shapes to meet needs for fewer joined parts, lighter units, simpler assemblies, and other product improvements. This report describes and compares the methods for cold-bending aluminum and analyzes tooling and lubrication

J M Adle, technical editor, KAISER ALUMINUM & CHEMICAL CORP

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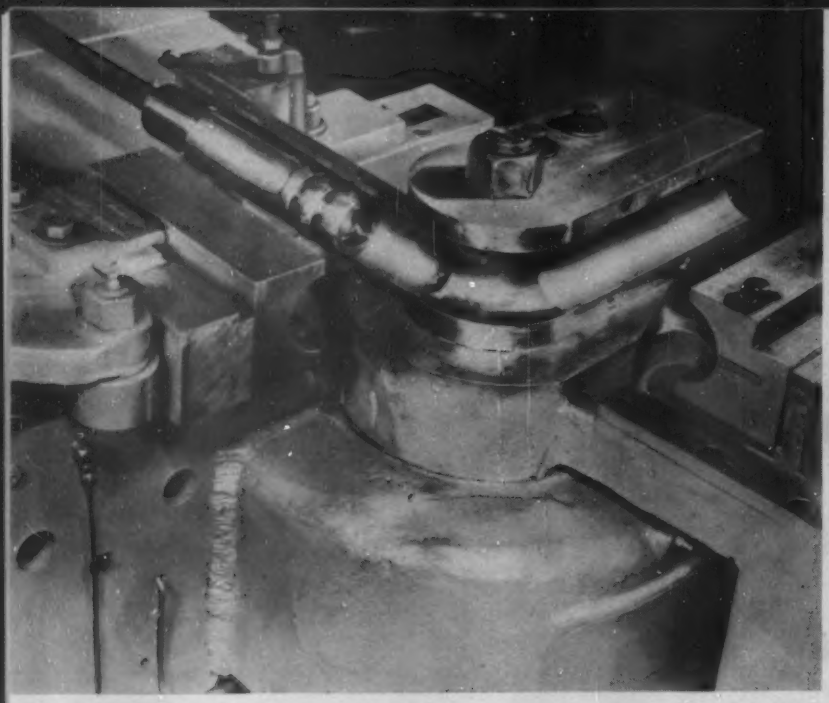


MANDREL in draw bender supports the tube near the point of bending to prevent collapse
Courtesy Pines Engineering Corp

Draw bending . . .

Draw bending, performed on several types of machines, is widely used for bending thin-wall aluminum tubing, pipe, and both hollow and solid sections. Machines are precision made with bending form mounted on and keyed to a center shaft that turns on anti-friction bearings. Rotary movement is obtained through a chain passing around the center-shaft drive sprocket and an idler sprocket. Chain ends are attached to the piston shaft of a double-end hydraulic cylinder that rotates the bending form through the desired arc.

The bending form or forming die is machined and polished to receive one-half the cross section of the part to be bent. In order to hold the part during the bending cycle, a hydraulically operated clamp is precision machined to fit the piece. Uniform holding force is exerted against the metal to prevent slippage and the complete clamping assembly rotates with the bending form.

A pressure die restrains the free end of the aluminum section and confines the movement of the metal along a straight line. This die may be either stationary or movable depending upon the type and thickness of the material being bent. In operation, the metal being formed is wiped into the groove of the bending form as the latter rotates.

The tendency of thin-walled tubing to flatten during forming requires the use of an internal supporting mandrel. The only metal being formed at a given instant is that section just beginning to follow the curve. During bending each increment of the section passes through this critical period at exactly the same place. Thus, a mandrel inserted at the point of bend will provide support to prevent excessive flattening or wrinkling. The actual amount of flattening which occurs is dependent upon the degree of the bend and the extent of mandrel support provided. Flattening usually ranges from 2 to 5% and is caused by the stretching action of the drawing operation immediately after the metal passes over the mandrel.

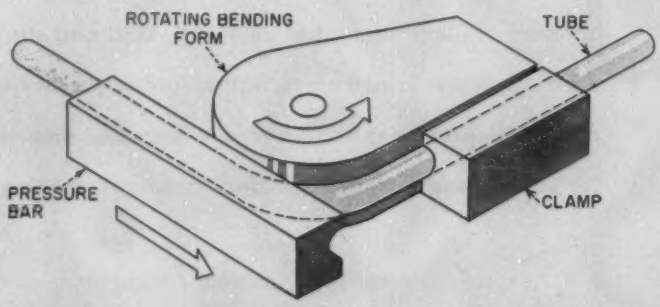
All the unbent portion of the material lies in a straight line behind the point of bend. Consequently, the mandrel can be mounted on a straight rod attached to the machine frame. This arrangement makes continuous bending possible and accordingly makes this type of equipment more flexible for changing requirements.

Compression bending . . .

Compression bending differs from draw bending in that the bending form is stationary. A shoe or wiper block is held tightly against the work by a roller mounted on a bending arm. The latter rotates around the bending form or die, causing the shoe to wipe or push the aluminum pipe, tube, or section into the die groove or cavity. Compression bending is employed where less wall thinning is desirable. While it it possible to make relatively close bends with a compression bender, this machine finds greater use in producing large radius bends (usually not less than three times the stock diameter).

The mechanically operated compression bender is built to precision standards and is operated through heavy duty gearing. Once the bending cycle is started, it continues until the piece is formed.

In most instances, clamps are not required to hold the parts being bent unless the bend is made to a



DRAW BENDING rotates the clamp and bending form together to draw the tube over a mandrel and into the desired bend

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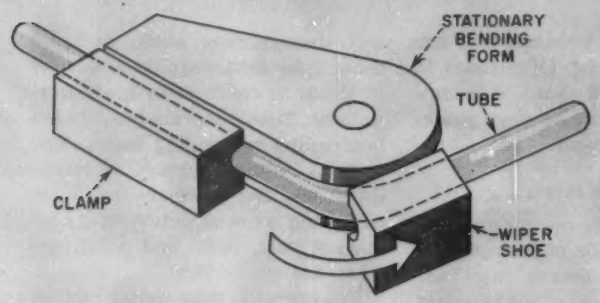
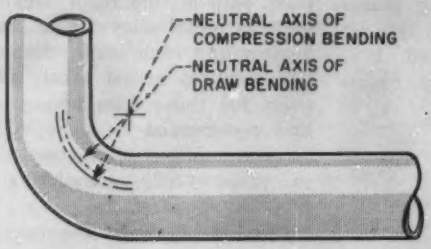
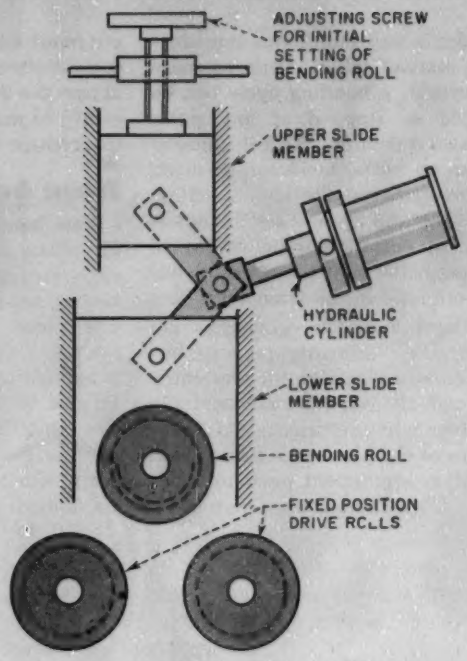
Condensed from the book, "Forming and Bending Kaiser Aluminum," to be published in June by Kaiser Aluminum & Chemical Corp.



COMPRESSION BENDING has stationary die and clamp. Wiper shoe attached to bending arm rotates around the die, pushing the work into the die groove



NEUTRAL AXIS (point of separation between compression and elongation) is closer to center line in compression bending



ROLL BENDING with hydraulic mechanism to apply pressure on center roll. Full circles and helixes can be produced
Courtesy Wallace Supplies Mfg Co

close radius. When this occurs, the piece must be firmly held, otherwise kinking might result. Generally, compression bending is used on those tubular sections that do not need mandrel support.

When a mandrel is used on the compression bender, it is mounted on the bending arm which applies the bending force. As the bend progresses, the mandrel recedes. Because of the sweep, considerably more space is required for the rotating members. Mandrel arrangement on a compression machine is fairly complicated both from the standpoint of mandrel mounting and also from a work loading and unloading standpoint. Continuous bending in a single tube is not possible.

While draw bending and compression bending produce similar shapes, they do not produce the exact part from a physical standpoint even though the bend be the same. Generally, compression bends are slightly thicker in cross-section than draw bends. Then, too, claims are made by one manufacturer of compression - bending equipment that there is considerable change in the ultimate position of the neutral axis. This axis retains its original length having neither been stretched through elongation nor shrunk by compression. In draw bending, the neutral axis lies within the inner third of the cross-section while in compression bending the neutral axis rests slightly nearer the center of the bend.

In determining the method for bending aluminum pipe and tube, factors to consider are wall thickness, degree of bend, type of alloy, whether or not a mandrel must be used, the quantity required, and finally the end product which will be acceptable for the application. Obviously, if rigid tolerances are not required and if slight flattening is not objectionable, then it is unnecessary to invest in costly tools. The ratio of both time and tool cost rapidly increases when making bends to precision standards.

Draw bending employing mandrel support is almost always used for thin-walled tube, especially where the tube is bent to a close radius. In many instances, different aluminnm alloys will respond satisfactorily to draw-bending operations without objectionable loss of physical characteristics. The cold working of aluminum in draw bending usually increases sectional strength at the bend even though the bending operation is quite severe.

Roll bending . . .

Roll benders offer a relatively simple means of bending a broad range of structural shapes, pipe, and tubing. They will form aluminum sections to any radius, equal to or greater than a fixed minimum and to any desired degree of arc. Full circles as well as helical coils are readily produced.

Roll bending, in effect, simulates the forming practice used to bend sheet and plate on conventional pinch and pyramid rolls. Three forming rolls are used, arranged in the vertical plane on some machines, in the horizontal plane on others. The center or bending roll is adjustable, while the two lower or opposing rolls are fixed.

The center roll applies the pressure or bending force, either by a hand-controlled adjusting screw or a hydraulically activated toggle mechanism. Basically, the hydrau-

lic toggle unit eliminates considerable manual labor. Perhaps more important, a bending cycle can be started or stopped at any point without difficulty. With this mechanism an initial bend can be made in the material for easy starting. Also, the unit re-indexes the bending roll permitting the rolling of helical coils with tangents on one or both ends in the same operation.

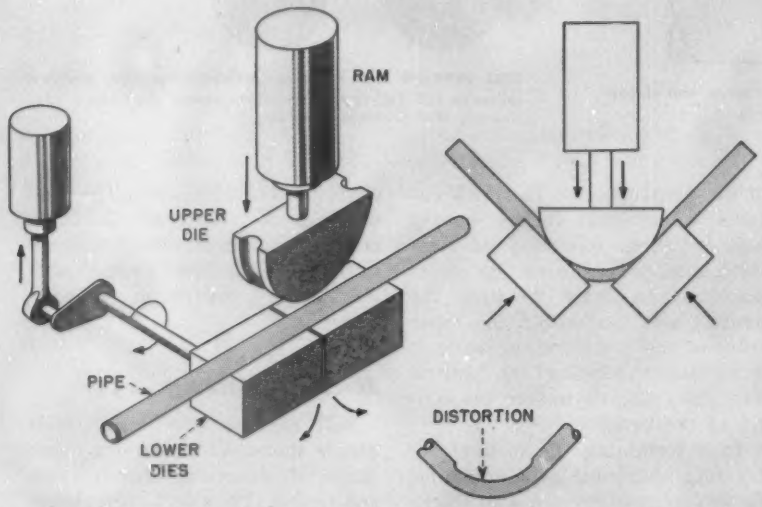
Where hydraulic power is not used, some difficulty may be experienced in starting the aluminum through the rolls. This is partially overcome by preforming the end or edges of the piece on a press brake or other equipment prior to bending. Even though excellent bends are made on roll benders, they are comparatively slow. Oftentimes, to obtain the desired shape, it is necessary to make two or more passes to produce the bend.

Ram bending . . .

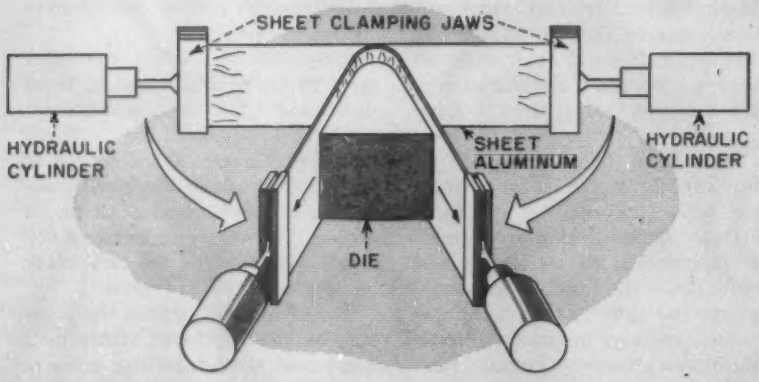
Ram bending is not only one of the oldest methods of forming various structural shapes, pipe, and tubing, but also one of the simplest. The piece to be bent is placed against two rigid supports and force is applied by means of the hydraulic ram to the center of the piece. The simplicity of bending places definite limitations on the type of work which can be handled. It is for industrial maintenance, repair and construction work, and for those jobs that require a variety of bends to conform to space limitations. Then, too, ram benders are best suited to bending heavy-wall sections where supporting mandrels are not needed and some flattening is not objectionable. Aluminum bars, rods, and solid sections are easily bent.

To prevent tube wrinkling or collapse, when bends must be made in thin-walled tubing, a variety of materials may be placed in the tube, including firmly packed dry sand, salt, melted rosin, and low-melting metal alloys. The process is slow and removal of the material requires added labor. However, for those jobs where tubes and pipes must be bent without wrinkles, filling offers one means of satisfactorily completing the bend.

Making bends on the ram machine requires a forming shoe mounted on the hydraulic piston ram. This shoe or die is machined with the desired contour of the section to be bent. Two pressure dies are mounted at a fixed level on pins which are set in the machine frame. The pressure dies are also machined to the contour of the part and, in addition, swivel or rotate on the mounting pins. As the forming pressure is exerted by the machine ram, the part is bent. There is no clamping needed because the piece slips over the grooved surface of the pressure dies. Material can be easily bent to a larger radius than the form by limiting advancement of the ram. Repositioning of the piece is then necessary as the forming cycle is repeated.



RAM BENDING in a press. Ram stroke can be adjusted to perform bends of different depths progressively

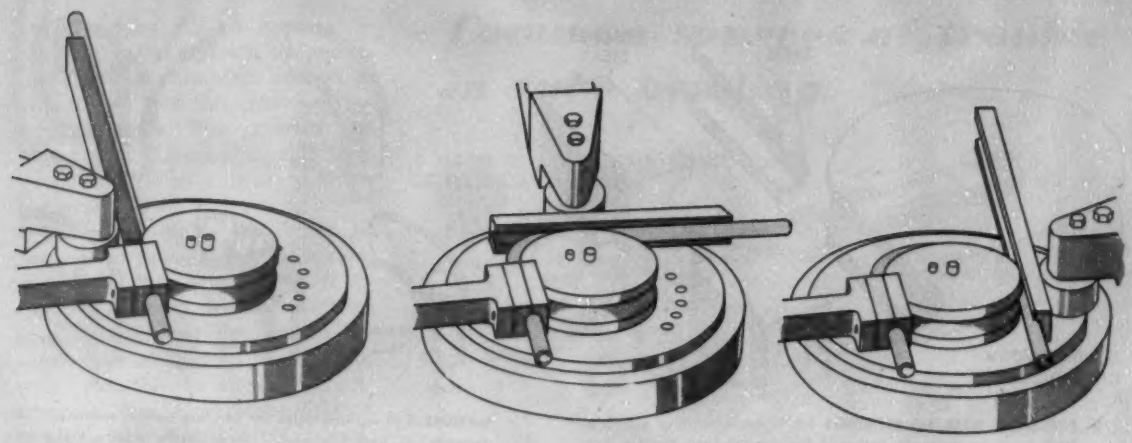


STRETCH BENDING pulls work around die and stretches beyond elastic limit to prevent springback

Progressive ram bending . . .

Ram bending can also be a high-production operation, especially where a large number of bends in different planes are made in a single length of tube. Usually each bend is produced one following the other in progressive fashion. At present this type of bending is used mostly in fabricating automotive exhaust pipes, but it offers a solution to many assembly problems.

Progressive bending may be han-



MANUAL BENDING MACHINES often simulate the action of power benders and are popular for light manufacturing operations
Courtesy O'Neil-Irwin Mfg Co

dled on a number of presses arranged in line. This method entails considerable effort and handling. To overcome this condition, a ram press has been designed to make numerous bends quickly and efficiently. The open structure of this machine permits easy movement of the tubular part both in a vertical and horizontal plane. The forward mounting of the tool holder, which overhangs the press bolster allows more working area in front of the machine. Thus, it is possible to make numerous bends without interference from projecting machine components. In addition, all bends made can be carefully watched as added assurance against over or under bending.

In operation, the vertical hydraulic bending press functions in the same manner as a ram bender. However, a number of features make this press considerably more flexible and faster in operation. Aluminum tube or pipe is placed in wing-type female die sections which open and rotate as the ram descends. Wing dies are mounted on heavy crank spindles equipped with anti-friction bearings. Cushion cylinders are mounted on either side of the press away from the actual work area. These cylinders maintain constant torque to prevent flattening and tube distortion. To prevent tube wrinkling on the inner bend radius, the ram die is made slightly under the tube size. This provides a pinching action as the bend is made and prevents wrinkles from forming in the bend.

Screw stops arranged in a rotating turret determine the length of ram stroke, making it possible to perform a series of different depth bends repeatedly. The turret stops index automatically with each press stroke saving time and effort in production work.

The hydraulic tube - bending press can easily handle the repeat bending of ½- to 2-in. OD aluminum tubing with a maximum wall thickness of 0.083 in. The smooth, even action of the hydraulic ram eliminates excessive flattening, wrinkling, or distortion. Clearance is provided to bend 2-in. tubing with 5-in. centerline radius of 180.°

Stretch bending . . .

Stretch bending is a distinct method of cold forming aluminum. This process requires that the metal be firmly secured between two holding clamps. A pulling force is then exerted on either end of the pipe, tube, or section, and the aluminum is caused to literally wrap itself over the stationary die or form. Through the controlled application of the stretching force, the part is pulled beyond its elastic limit to eliminate residual stresses which, upon release of the part, might cause the metal to assume its original form.

Draw bending, compression bending, roll bending, and ram bending all stretch and compress the metal in the bend. Stretch bending, in contrast, elongates the metal in all sections. Wall thickness, in general, is reduced, but in the process greater uniformity results. Thickness reduction in stretch bending has been estimated at approximately 40% of the total elongation.

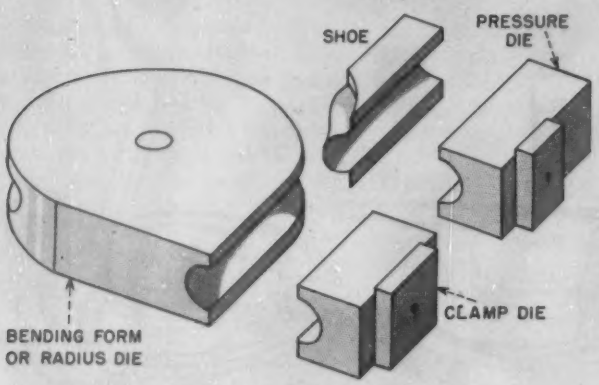
Cold working in this operation narrows the plastic range, but the ultimate strength is usually increased. Heat - treatment after stretch bending will cancel out these characteristics of cold working, but will, of course, return the metal to its original temper for further working.

Manual benders . . .

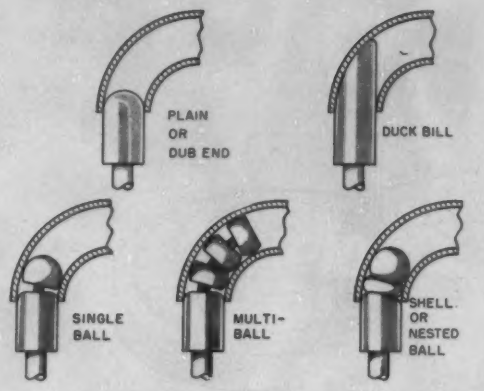
There are many different types of manually operated benders available for forming and shaping aluminum. A number of these are well adapted for light manufacturing.

While power-operated benders receive their bending force either through hydraulic or mechanical means, many of the hand benders depend upon a simple lever or adaptation of leverage for such force. Consequently, there is a broad variation in the types of hand benders available.

Where on-the-job bending may require more force than can be obtained through simple lever-action benders, a portable ram-type machine is available. This unit duplicates the bending action of the power-operated ram bender. However, instead of having a power-driven hydraulic piston, fluid or oil is pumped by hand to the cylinder to operate the piston and ram.



PRECISION TOOLING ELEMENTS for a draw-bending machine. Each must be properly designed for the job, but the bending form is most critical



MANDRELS of various types for bending hollow sections. Choice depends on wall thickness. Thinner walls require the greater support of ball mandrels

Tool Design...

Tooling is a major consideration on all machines. Even though the bender has ample power and is correctly tooled, characteristics of the aluminum will influence the radius of the bend to be made. Obviously, 2S-O, 3S-O, 50S-O, and 4S-O aluminum alloys with elongation ratings of 25 to 35% will be easier to bend than hardened alloys having far less ductile qualities. Elongation of the aluminum alloy determines the centerline radius for a given section. In the past, the general accepted criteria for successful bending centered in producing the largest possible radius to meet the required demand. This arbitrary practice has since been revised. In the interest of standardization, current design centers in the minimum practical radius for a given job to increase the flexibility and application of the tooling. At present, a bend radius from 1½ to 3 times the tube diameter is common, and many aircraft plants are standardizing on a bend radius of 2 dia. As the radius becomes shorter in thinner-gage aluminum tubing, tooling must become better from a precision standpoint.

Perhaps the most important component in a tooling setup is the bending form or radius die. On the draw type of bender this unit must be precision machined and keyed to fit the center shaft drive spindle and accurately positioned in relationship to the clamp die, pressure die, or shoe. The bending form must rotate in an arc of constant radius during the bending operation. Decimal variation of a few thousandths of an inch may mean the success or failure of a bend. In addition, each component must be designed to properly align and guide the aluminum section as it is bent. This requires precision die finishing and polishing with contours or die cavities made to match the shape of the metal section to be formed. Distortion of the part may result if dies are not properly made and aligned on the bender.

During bending, it is important that the material be rigidly clamped. There should be no slippage as bending progresses. To accomplish this, an ample straight portion of the aluminum section should be provided to meet clamping needs. Ordinarily, these lengths may be approximated thus:

2 D for 3 to 5 times the CLR of bend.

3 D for 2 to 3 times the CLR of bend.

4 D for 1 to 2 times the CLR of bend.

(D is tube diameter and CLR is centerline radius.) In some instances, where very-thin-walled sections must be clamped, a plug is used in the tube end to prevent collapse.

Design of the clamping die, in addition to having the contour of the piece, should be made so that it will grip the greatest possible area to lessen the chance of slippage.

The clamping die is usually a separate tool, but sometimes it becomes a part of the bending form itself. In such cases, the form is in two parts, split along its centerline in the plane of the bend. The clamping action is then obtained by drawing the two parts together with suitable fasteners. For single bends, the clamping die is made to hold a straight portion of the material to be bent, so that the completed bend will lie immediately behind the clamped part. For compound bends, where two bends are next to each other, a special clamping die is made for the second bend, contoured to fit the end of the first bend. Also, the bending form must be similarly machined or grooved to receive the formed section.

The pressure die on draw benders receives the wear and abrasion caused by the material sliding along its surface except with roller or follower dies. As a result, this tool component must be made of suitable material to withstand the abrasive action. Various wear-resistant alloys and hardened tool-steel blocks are used for this purpose. In most cases the pressure die is finish machined and polished to prevent seizure as metal-to-metal contact is made during the bending cycle. Different types of pressure dies are used, depending upon metal and bend requirement. The most common are the stationary type, the roller type, and the

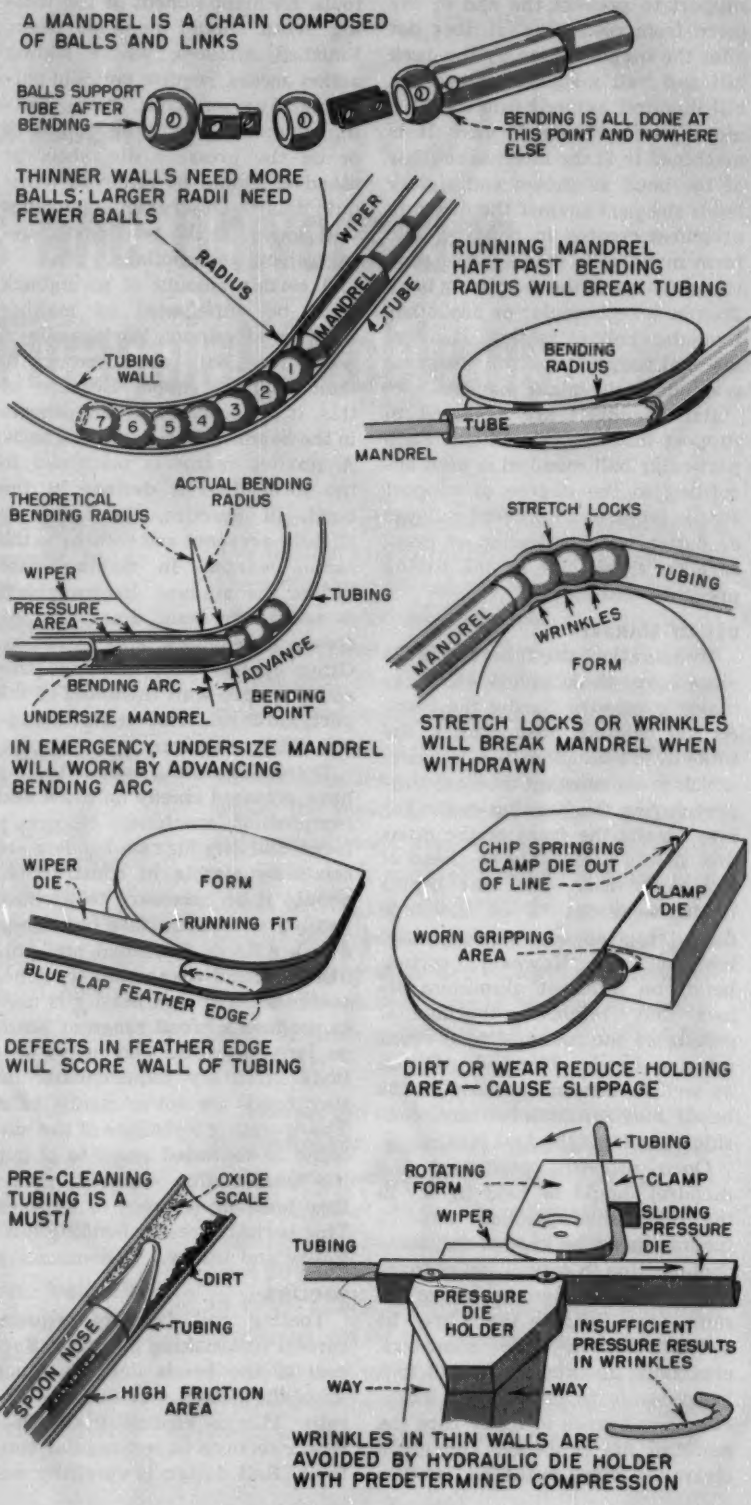
follower type. All are used to restrain, but not restrict, the movement of the aluminum section as it is drawn into the groove of the bending form. The pressure die performs a function similar to a pressure plate on a standard forming press.

The roller die is grooved to fit the section being formed. This die is placed on a suitable shaft or spindle attached to the machine frame. As the part is bent the die rotates, reducing both friction and wear common to the stationary pressure die. For more difficult bends, a follower die is often used. This unit travels on a series of rollers which provide better guidance and more uniform restraining pressure on the part.

Much of the success in bending aluminum tube, pipe, and structural sections depends upon the shoe component of the tooling setup. This essential unit is machined to the desired contour of the piece. However, a more important function rests in its fit to the bending form. The front edge of the shoe must come as close as possible to the starting point of the radius on the form. The tip or edge of the shoe may be "feathered" to improve this fit. In addition to a guiding or aligning function, the shoe also supports the material being bent. This unit is located opposite the pressure die and provides initial support needed to prevent possible wrinkling or buckling of the part at the start of the bend. Like the pressure die, the shoe is subject to abrasion and wear, and it, too, is made of different wear-resistant alloys and hardened tool steels.

While many tubular aluminum parts are successfully bent without internal support, there are numerous thin-walled hollow sections that require mandrels to prevent distortion or collapse. Different types of mandrels for power benders include the plain or dub-end mandrel, the duck-bill mandrel, the form mandrel, and the single ball, multiple ball, and shell- or nested-ball mandrels. The solid mandrels (plain and duck-bill), are for bending heavier-walled sections. These mandrels are designed to prevent initial wrinkling,

Common sources of trouble in tube bending



buckling, or part collapse at the start and critical moment of bend.

The plain mandrel has a rounded end, and while offering sufficient support to prevent the end of the piece from collapsing, it does not offer the support given by the duck bill and ball mandrels. The duck bill mandrel extends into the aluinum section being formed. It is machined to fit the internal contour of the bend as shown and rigidly holds the part against the drawing pressures created in bending. The form mandrel is made to the contour or shape of the part being bent, such as a rectangular or any other irregular hollow section. It offers internal support much in the same manner as the plain mandrel.

Ball mandrels are designed to support thin-walled sections. Each particular ball mandrel is used according to the degree of support that is required to prevent collapse or flattening. Application of pressure on either side of the tubing prevents wrinkles.

USE OF MANDREL

In operation, the tube or part is placed over the mandrel which remains stationary during the bend. As the bending form rotates, the tube is drawn over the mandrel which gives constant internal support during the bending cycle. For best results the front of the mandrel should preferably be ahead of the point where the tube begins to bend. About ⅛ of the tube diameter is an average for initial tool settings. However, certain bends on different aluminum alloys may require experimental setting of the mandrel to prevent inferior bends. Mandrel position as well as internal position in the bend, may ultimately vary considerably from the first setting.

Once properly positioned the mandrel should be held tightly in the established position. Also, a record should be kept of the mandrel position in case of job changeover and subsequent re-run of the same part. Because there may be a variation in tube diameters, especially in extruded product, it is advisable to check such diameters in advance to make sure the mandrel fits properly. Too much clearance may result in trouble, while not enough will prevent efficient bending.

Considerable care should be exercised in maintaining bending tools. Each component of the tooling setup should be kept clean. Finished surfaces, where sliding action occurs, require periodic polishing. Any scratches, burrs, galling, or metal pick up developed in or on the pressure die, shoe, or mandrel should be removed without delay. Otherwise, blemishes will appear in the bent part causing rejects and spoilage.

A certain amount of springback must be anticipated in making bends in aluminum. Various alloys, when bent, will tend to return to their original shape. Because of this, it is necessary to compensate in the bending form for springback. A smaller radius is machined in the form than is desired in the bend. In practice, the metal is slightly overbent and returns to the radius wanted. In making close bends, the amount of springback is small. As bend diameters increase, springback also increases. Other factors that influence this condition are wall thickness of the part, hardness, temper, and ductility of the aluminum.

Details regarding bender tooling have centered chiefly on draw and compression machines. Necessary forms and dies for ram benders are relatively simple in construction. Should it be necessary to produce bends free from surface blemishes, dies are finish machined and polished to eliminate possible scratches and mars. The ram bender is used to produce a broad range of bends on large diameter and heavy sections. Accuracy requirements for such bends are not as rigidly held. The operating technique of the machine is depended upon to obtain the bend radius required, rather than built-in accuracy of the dies. This permits greater bending flexibility and utility.

TOOLING

Tooling roll benders requires careful tool making practices. Success of the bends depends much upon the design and finish of the rolls. This is especially the case where sections have irregular contours. Roll design is carefully determined for the part to be bent. The rolls are then made to correct diameters and tolerances. Consideration must be given to the finish desired, slippage, and to springback. Should the aluminum section require high finish after bending, the rolls are hardened, ground, and polished. To insure continuous performance, they must be kept free of dirt, scratches, galling, and metal pickup. In this respect, the same care is exercised in roll maintenance as any precision tool for production operations.

Lubrication . . .

Ordinarily, stock bent on ram benders, roll benders, and certain compression benders need not be lubricated. Nor is it necessary to apply lubricant to aluminum formed on hand benders. This is largely due to the technique and equipment employed and also to the large radius bends usually produced. However, some of the most severe stresses in forming are encountered in draw bending, stretch bending, and in numerous compression bending operations. With more and more emphasis being placed upon bending thin walled sections and also making radius bends to 1, 1½, and 2 times diameter, lubrication becomes important.

For example, in bending thin walled tube, it is necessary to provide proper lubrication on the inside as well as outside so the aluminum will slide easily over the mandrel supporting surface as well as through the compression dies. Lack of lubricant or improper lubrication might easily spoil the bend. The type of lubricant to use depends upon the severity of the bend. Generally, for medium and medium heavy bending operations, a water soluble paste is satisfactory. For heavy bending, a viscous oil is used. Not all lubricants respond in the same manner to the bending operation. Experimentation is required to determine the lubricant best suited for the work. In practice, bending certain aluminum alloys proved impossible with one lubricant, but with another no difficulty was experienced.

FINANCIAL AID TO HIGHER EDUCATION

Our Colleges and Universities Face Grave Financial Problems

For the past decade the nation's colleges and universities have been caught in a destructive financial squeeze. It is particularly destructive for the independent, privately endowed institutions. Unless extraordinary measures are taken to relieve this squeeze, it promises to become progressively worse. To let it do that is to court a national disaster.

This is the first of two editorials devoted to the financial plight of our colleges and universities. This first editorial deals with the character of the problem, present and potential. The second will indicate some things that need to be done about it, and particularly what American business might do.

Enrollment Soars, Income Lags

In broad outline, the financial problem that afflicts our colleges and universities is simple. The demand for their services has increased rapidly, and promises to keep on increasing even more rapidly. At the same time, their financial capacity to provide these services has lagged behind, primarily because of price inflation.

Between 1940 and 1950, college and university enrollment increased from approximately 1⅓ million to 2⅓ million—about 75 per cent. Over the same period, the educational income of these institutions, measured in terms of its actual purchasing power, increased only about 64 per cent. Thus, at the end of the decade, our colleges and universities as a group had, on the average, about 6 per cent less to spend per student than they had at the beginning. Meanwhile, the rapid advance of science and technology had made a good college or university course a much more expensive operation than it was in 1940. Since 1950, the latest date for which comprehensive figures are available, the financial squeeze on our colleges and universities has intensified, largely because of another wave of price inflation touched off by the Korean War.

Among the colleges and universities, the independent, privately endowed institutions are particularly hard pressed. In terms of actual purchasing power, the independent liberal arts colleges are now spending at least 20 per cent less per student than they spent in 1940. Public institutions of higher learning, supported out of tax revenues, have managed to increase slightly their expenditure per student. Otherwise, the financial squeeze on higher education as a whole would be even more severe.

Why Independent Colleges Are Hit Hardest

The principal reason why the independent colleges and universities are so hard up is the shrinkage in their income from endowments. These endowments, created in other days by gifts of generous benefactors to help pay the expenses of higher education, have been hit hard from two directions. During the war and post-war years, the tax collector took so large a part of the incomes and estates of wealthy people that this source of endowments has been greatly reduced. Over the same period price inflation cut in half the purchasing power of the income derived from existing endowments. In 1940 income from endowments provided 26 per cent of the total income of the independent colleges and universities. By 1950 it provided only 14 per cent. The figure is still lower today.

The financial plight of the independent colleges and universities is directly reflected in the salary status of their teaching staffs. In mid-1952 a national survey showed that, after adjustment for the increased cost of living, the salaries of those holding full professorial rank in these institutions were 12 per cent lower than they were in 1941-42. Junior teachers, with the rank of instructor, fared somewhat better. In terms of actual purchasing power, their salaries declined only 2 per cent over the 12-year period, largely because there is more direct competition for their services from industry. Over the same period, the real wages of industrial workers increased 55 per cent.

Time Will Not Provide a Cure

The plight of the colleges and universities, which is shared in some degree by all parts of our educational system, is not one that can be left to time for a cure. On the contrary, the financial problems of our institutions of higher learning will be intensified in the years ahead by the pressure of rapidly increasing enrollments. Present prospects indicate that during the next decade college and university enrollment will increase by about one-third, or from 2⅓ million to over 3 million. The problem of increased enrollments will become particularly acute toward the end of this decade when the babies born during the great surge of population in World War II are ready to enter college.

Such an increase in population as that now in prospect can be a tremendous asset to the nation. It is still a truth, even though it is worn a bit thin by frequent repetition at commencement exercises, that a nation has no resource more valuable than the education of its people. And the better the education, the more valuable the asset.

But to realize this, our colleges and universities must have the financial strength to handle the increased enrollments that face them in the years ahead. This means that we must relieve our independent colleges and universities, in particular, from the financial squeeze in which they are now caught and make them full partners in the economic well-being of the nation. Some of the means by which American business might help achieve this will be discussed in a second editorial.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

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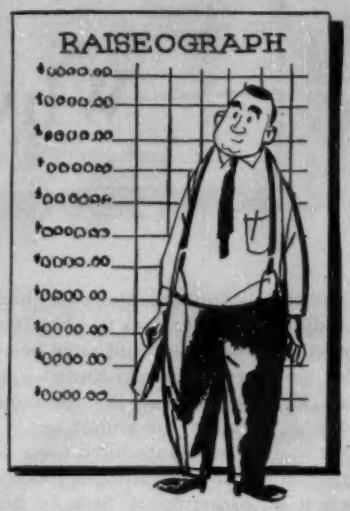
Donald C. McGraw

PRESIDENT

McGRAW-HILL PUBLISHING COMPANY, INC.

Round Table

Duckin' the Buck



"I just got rid of a big headache, Ed. Now I don't have to worry about wage increases."

"What did you do, Al, put everyone on a monthly payroll?"

"Nope; I just arranged for the personnel department to handle all wage complaints and increases. Now they've got the trouble."

"How did you manage that, Al? I thought every foreman was supposed to review all raises in his department."

"They've got a new rule, now. If the foreman asks for it, the personnel department will handle the grief; providing he submits working rules that cover all cases except automatic increases."

"How can you cover all the reasons for increases with a few rules, Al? I've heard more odd excuses for increases in my department than you could list on the factory roof."

"That's the part that makes it easy, Ed. I just wrote down all the good, legitimate reasons for raises I could think of, and how much they should be, and let it go at that. It took me a couple of nights' work, but I won't have to worry about it from now on."

"That's what you think, boy. Those workers of yours will be on your neck in no time, all of them with different good reasons."

"I don't care, Ed. All I have to do now is put up a notice that they have to see the personnel department for any raises, and that I haven't a thing to say about it. Once they understand that, I won't be bothered."

"You're awfully wrong, Al. Why, those guys will climb all over you with special requests and special cases. You can't sidestep raises, Al. After all, it's one of your most important responsibilities."

"Look, Ed. If the union can set up a bunch of rules dealing with the reasons why we have to give out raises when we don't think they're deserved, why can't we set up a similar system?"

"Just because you must take a personal hand in increases. It's a human factor, Al, and it has to have human understanding."

"What's the matter with Personnel—aren't those guys human, too?"

"Sure, but if you give them rules, they can't be expected to interpret them the same way you would."

"That's not my concern now. Let the men argue in the front office. I'm sick of hearing their gripes."

"You're liable to make your crew mad enough to quit, Al. Increases are a "must" with foremen."

***CAN INCREASES BE PUT** in a set of rules—to cover all cases? How will the men feel when they hear they have to deal with a different department concerning raises? Your opinions on the subject may be valuable to others. Discussions of earlier topics appear on later pages.*

Why... production-wise, plant-

W K OUSLEY, vice president, BOSTON MANUFACTURERS MUTUAL FIRE INSURANCE CO

If five simple fundamental rules had been followed, a study of all major fires in industrial history would show that every one could have been avoided. These rules have been common knowledge for at least 50 years. Even so, the same few fundamentals still stand today, as we enter the atomic age.

Many modern plants have been designed without regard to the unusual and unexpected. True, the frequency of catastrophic fires is not great—a fact which lulls us into a sense of false security and belief that "it can't happen here." Yet quality control in these same plants is based on the knowledge that "what *can* happen, *may* happen."

The purpose of this article is to show how any plant engineer can apply them to his own operations—and practically guarantee that fires of catastrophic proportions will not occur.

First determine what can happen and then use the following simple rules to prevent it happening if possible, or, to insure that if fire does occur, you won't be put out of business.

Why does the mention of plant protection lull most industrial people into complacency like the strains of a harp? Although they are progressive and wide-awake in all other plant affairs, all attempts to forewarn them of impending disasters are politely met with sly grins, and there the matter drops. Must they wait until disaster strikes the plant before they can be snapped into reality? Why let it happen to you when following a few basic rules will make your plant a safe place to work? (AM—July 23 '51, p135, p148—Nov 25 '53, p129)

1. Use Safe Construction. From a fire standpoint, it doesn't make too much difference whether you construct your building of brick, steel, concrete or wood—as long as you avoid wooden walls and quick-burning boards or joists, roofs and floors. Most construction can be adequately protected with automatic sprinklers. While sprinklers are extremely reliable, they are subject to human frailties and mechanical failure. As a second line of defense, fire resistive dividing walls are necessary, to avoid total destruction in event of fire.

Disregarding sprinklers, a basic question you must ask yourself is "How much of the plant can I afford to lose?" It follows that you can lose whatever portion of the plant which is not separated by fire-resistive walls or open areas. How large should one fire area be? There is no specific answer, but the following general rules might well apply.

1. When generally combustible materials are in a combustible or a non-combustible building, (under the best conditions) a single fire area should not exceed 100,000 sq ft. Valuable concentrations of combustibles or hazardous operations will greatly reduce permissible area.

2. When generally non-combustible materials are in a non-combustible building, areas may be as large as desired if concentrations of combustibles are segregated within fire-resistive walls.

3. In multi-story buildings, stairs, elevators and other floor openings should be enclosed with materials at least as fire resistive as the floors.

4. Should a fire start within a building and the sprinklers are out of service, fire fighting by hose streams from outside will not be effective if the building is much over 200 ft wide.

5. In planning the size and arrangement of fire areas, operations should be designed whenever possible so that destruction of one fire area will not knock out entire production.

2. Sprinkler Installation. Automatic sprinklers are your main line of fire defense. They do more to protect plants and employees than any other single factor. Sprinklers strike at the seat of fire unhindered by heat or smoke. They eliminate unnecessary water damage because only sprinklers that are

protection foolish?

needed will go into action. To be effective, sprinkler coverage must be complete wherever there are combustibles. If fire burns unchecked in an area not protected with sprinklers, heat thansfer to adjoining areas will open more sprinklers than can be supplied with water. An average water demand for sprinklers over moderate combustibles is about ¼ gpm per sq ft of floor area. Therefore, if sprinklers were called upon over an area of 8000 sq ft, water demand would be 2000 gpm, which only the strongest water system can supply.

3. Provide Enough Water. An adequate water supply is one that will supply all the sprinklers likely to operate for the probable duration of fire and will simultaneously supply quantity of water required for hose streams. The usual hose stream discharges 250 gpm or more. In many cases, public mains alone will not provide all the water needed for fire protection. For that reason, elevated gravity tanks or pump suction tanks located at ground level have come to be a common sight at large industrial properties. These secondary supplies mean that water will always be available for sprinklers even though public water is out of service.

4. Train Personnel In Fire Safety. People trained in safety measures will prevent fire and accidents and can nearly always bring a blaze quickly under control. Personnel schooled in handling types of fires to which a particular plant is subject have repaid the effort of organization many times over. You can depend on public fire departments, but never during the vital first few minutes.

The first step for all plants, regardless of size, is to organize fire squads of 5 or 6 key employees in each department. Make them "on-the-job" inspectors to report and correct conditions which start fires and cause accidents. Provide proper educational material for them to study. Teach them the use of extinguishers, good housekeeping, and the importance of automatic sprinklers. Well-trained men will keep their heads in an emergency, and any blaze will have small chance of survival.

Plants having private hydrants and hose systems need trained men to use them quickly when needed. The men should be familiar with the entire plant protective system. Drill them frequently—handling a large hose stream is never a job for an amateur. Plan the organization so each man will have a definite task. Competence through experience will greatly reduce the chances of a fire getting started.

Responsible maintenance men should make careful weekly inspections of safety and fire-protection equipment. A good report form, standardizing inspection and filled out during inspection will reduce danger of important omissions such as inadvertently closed sprinkler valves which each year account for multi-million dollar losses in fully sprinklered plants

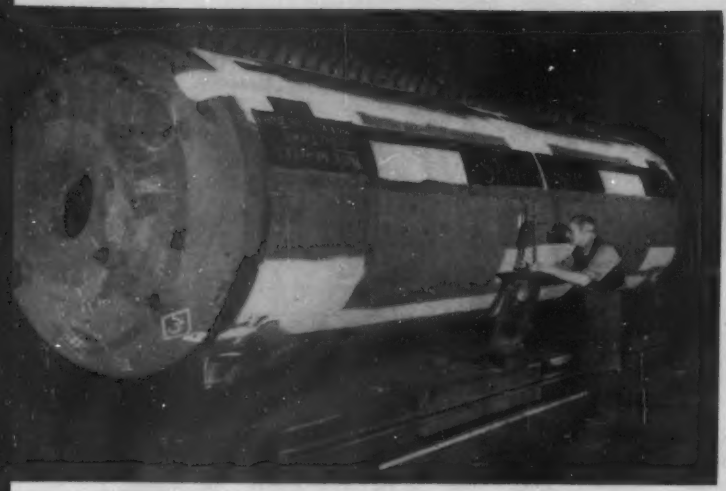
Exit requirements in every plant should be carefully evaluated against the Building Exits code issued by National Fire Protective Association. In no case should employees have to travel more than 150 ft to a safe exit. Because emergencies occur infrequently, the only way to be sure that people will respond correctly is through proper training. This applies not only to fire squads, watchmen and fire brigades, but to evacuation of buildings without confusion.

5. Provide Wholehearted Support By Top Management. Responsibility for a safe plant rests squarely with management. It is up to management to see that interest in safety and fire protection pervades the entire organization down through supervisory personnel to employees themselves.

Planning and coordinating prevention and protection must be definitely assigned to one or several individuals as plant size and organization require. Men given this responsibility must be able to make subordinates realize that accident and fire prevention are part of their job of maintaining uninterrupted production.

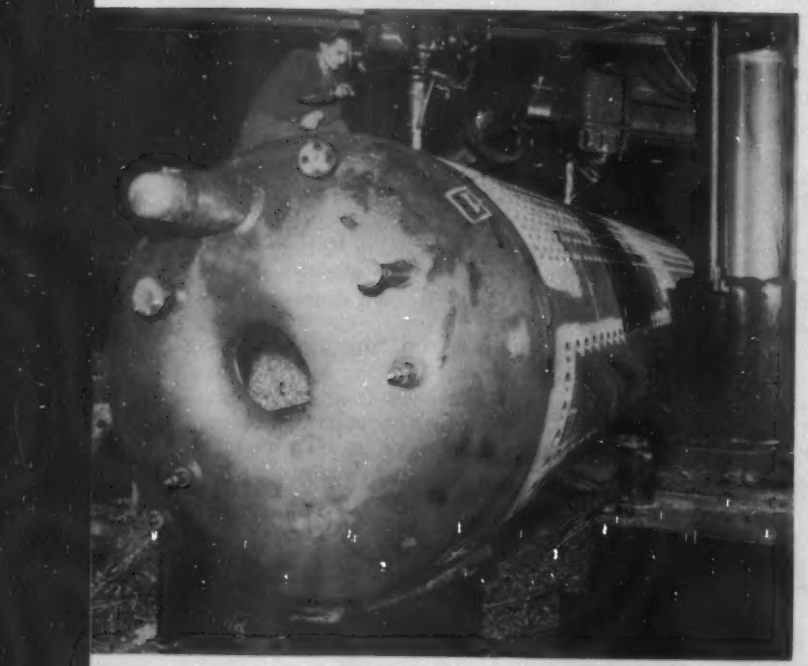
Requirements for fire safety are often disregarded because of objections of those responsible for manufacturing. This conflict can be avoided if your fire and casualty underwriters are given the opportunity of working with you in planning new facilities. Careful observation of these rules will restrict any fire to a small area, protect the lines of employees, and prevent extensive interruption of production.

Abstracted from a paper presented recently at the SAE Annual Meeting in Detroit.



FIRST ROW of tube holes is laid out on surface of boiler drum. Drill jig is then positioned to the layout and locked in place with roller chain and jacks

Radial drills make...



RADIAL DRILLS remove 3 tons of material in drilling, counterboring, and grooving 1010 tube holes in 29-ft-long boiler drums. Material is about 3 in. thick

Chips by the ton

LEO BRAUN, process engineer
DOMINION BRIDGE CO, LTD, LACHINE, CANADA

Over three tons of chips are removed when drilling and counterboring tube holes in 38-ton boiler drum made from welded plate over 3 in. thick

Two radial drills work side by side on the same workpiece in a setup developed by Dominion Bridge Co for machining outsize boiler drums. The drum is set in two V-blocks so the flat portion of the head rides on hardened wear strips, and the first row of holes is laid out. A drill jig is then lined up and clamped by roller chains and special jacks. Pilot holes, 1 5/16-in.-dia, are drilled with standard twist drills; then the jacks are released and the jig moved over to one side of the drum. A 3-lip core drill mounted in a special short holder with a roller pilot is used to open up the holes, leaving 1/32 in. all around for reaming. Reaming is done with a special reamer which fits the same holder as the drill and has unevenly spaced flutes. It is sharpened to produce continuous, curled chips that do not clog but leave a bright hole with no chatter marks.

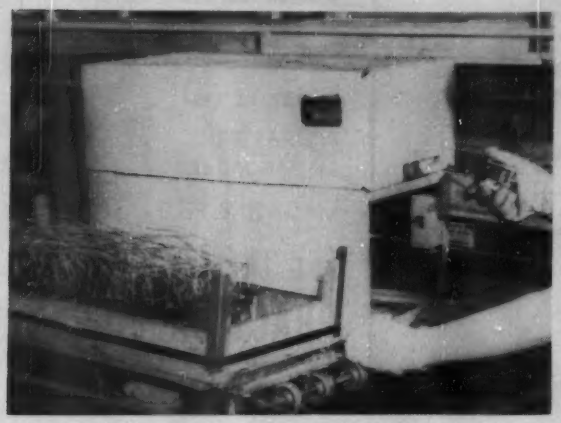
Altogether, 1010 tube holes are drilled in each drum; 782 are 2 17/32 in. in dia, and 228 are 3 9/32 in. All have a 3⅜-in. counterbore, 1⅜ in. deep, and three concentric grooves 1/16 in. wide, 3/64 in. deep, and spaced 3/16 in. apart.

The three grooves are cut with a special form tool, and counterboring is done with a flat cutter mounted in a special holder. After this, the reamer is again passed through the holes to remove any burrs raised by the grooving and counterboring tools.

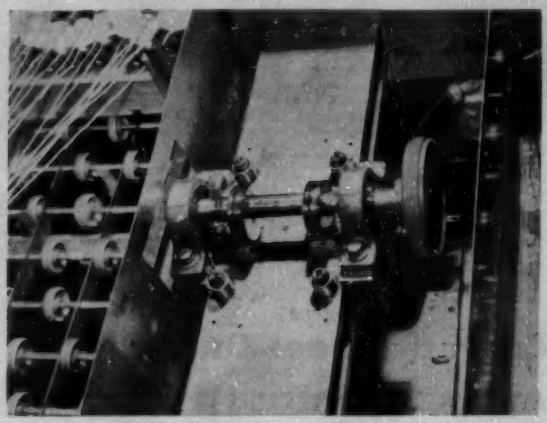
When a full row of holes is finished, the spindle is lined up with any convenient hole, the arm is locked, and the drum rotated to the next row and positioned to the locked spindle. Time for a full row of holes is 15 min.

Drums consist of two tube sheets 3 13/32 in. thick, two wrapper sheets 2⅝ in. thick, and two heads 2 13/16 in. thick. They are 78 in. OD, 29 ft, 9½ in. long, and weigh 75,000 lb before drilling, 69,000 lb after. They were made for Foster-Wheeler Ltd, and recently installed in the Edmonton plant of Canadian Chemicals Ltd. The four units are designed to operate at 600 psi at 750 F, and are of all-welded construction. Material is firebox-quality steel with a tensile strength of 70,000 to 82,000 psi, and all welds were made by the submerged-arc, multi-pass process, and fully X-rayed.

Practical Ideas . . .



MORE THAN 400 TUBES are straightened hourly in this unit



INTERIOR OF UNIT SHOWS V-belt drive and cams which reciprocate upper plate

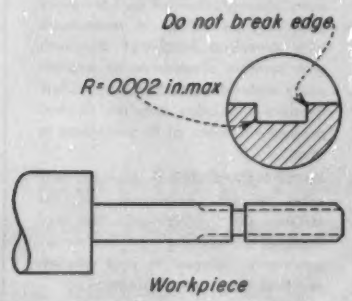
Hardwood Boards Straighten Small Tubes

Control units for refrigerators have 3/32-in.-OD, 24-in. copper capillary tubes which become bent as the assemblies are moved from station to station along the assembly line. The tubes have to be straightened before final inspection and testing operations can be performed.

Hand straightening is difficult and time consuming, so a mechanical straightener was developed for the job. It consists of two 6 x 24-in. horizontal steel plates, the faces of which are lined with ½-in. thick hardwood boards. The lower plate is supported rigidly on a stand, while the upper plate is supported on guide pins and springs, the opening between the plates being adjustable from 3/32 to ½ in.

Two 4-in.-OD circular cams are mounted eccentrically on a drive shaft supported in ball bearing pillow blocks across the center of the assembly, cams bearing on hardened steel shoes attached to the upper steel plate. Throw of the cams is ½-in. Camshaft is rotated at about 300 rpm so the upper plate reciprocates rapidly up and down.

The straightener is surrounded with a sheet steel cabinet having a slot in one end opposite the opening between the two plates. Operator of the unit straightens the tubes roughly by hand, to remove loops and shorter bends, then inserts them one at a time into a slot. She slowly revolves the tube between the plates, until it is straight. *Edward Smalenberger, Manufacturing Engineer, General Electric Co, Morrison, Ill*



"Plaster Cast" Solves Tough Deburring Problem

We had a difficult deburring problem when making a small aluminum-bronze rotor assembly. The part was a small gear, and deburring required removing burrs from the snap-ring groove without breaking the sharp edge. The gear had 9 teeth, with OD of 0.1244 in., and PD of 0.093 in.

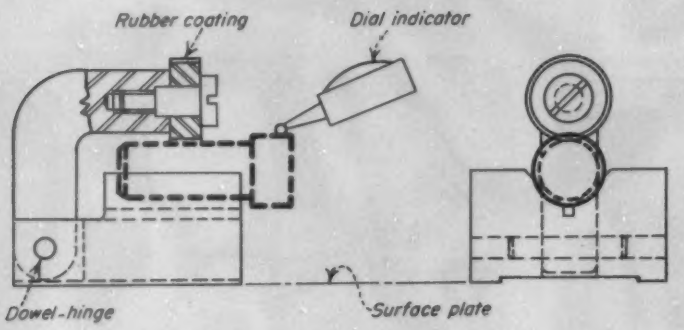
The ring groove was cut after the teeth were formed.

We mixed up some plaster of Paris in a paper cup, making a consistency which will flow to the roots of the gear teeth, and dip the part of the gear which is to be grooved. Stand the parts upright in a tray, to dry for about an hour.

When the plaster is dry, machine the groove, being sure to use a sharp grooving tool. Remove the plaster by submerging the part in water until the plaster softens. The coating will usually be soft enough to remove by hand, with a bakelite chisel taking care of the last remaining bits.

This method produced a part completely free of burrs. *Harold Rhodenbaugh, Grand Rapids, Mich*

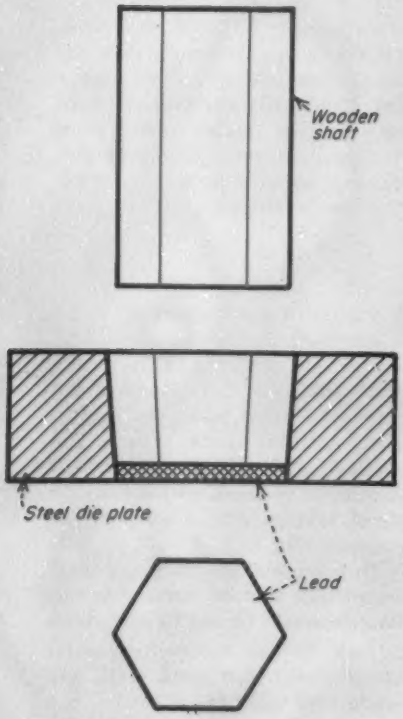
Ed note: Certain low-melting-point alloys would also work well, and might save tool life.



Coated Wheel On V-Block Aids Concentricity Check

Production parts often have to be checked for concentricity; the usual method of rotating the part in a V-block is rather slow. To do the job more quickly, we made the fixture shown. The holding arm hinges on a dowel pressed into the base of the V-block, and holds a rubber coated wheel. The rubber coating serves two purposes: It aids in turning the part, and prevents marking the part.

Concentricity is checked with an indicator gage, as is customary with a conventional V-block. *Cliff Bossman, Dayton, Ohio*



Thin Lead Plate Measures Die-Opening Dimensions

The method shown is one we use to measure a hole in a punch or similar tool, giving very exact results very cheaply.

Put the die plate (in this case having a hexagonal hole) on a steel plate, with the wide end of the hole upward. Then place a lead plate about ⅛ in. thick and slightly larger than the opening, in the hole in the die plate. Then prepare a wooden shaft of slightly larger dimensions, but of the same outline as the opening. Place the shaft of wood on the lead.

Hammer the wooden shaft until the lead presses on the side of the hole. Now raise the die plate and push the lead through the opening.

The lead now has exactly the same dimensions as the hole, and because it is an outside surface, is much easier to measure than the inside surface would be. *Erik Roed, Hedensted, Denmark*

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JUDGES—A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in a tie, $25 will be paid to each and every co-winner. Decision of the readers will be final in each case.

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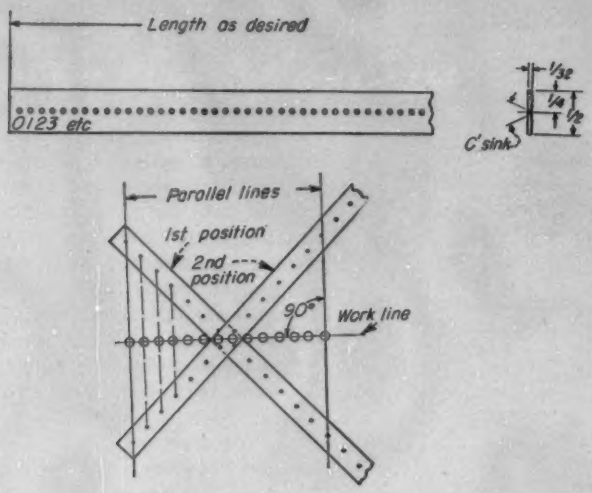
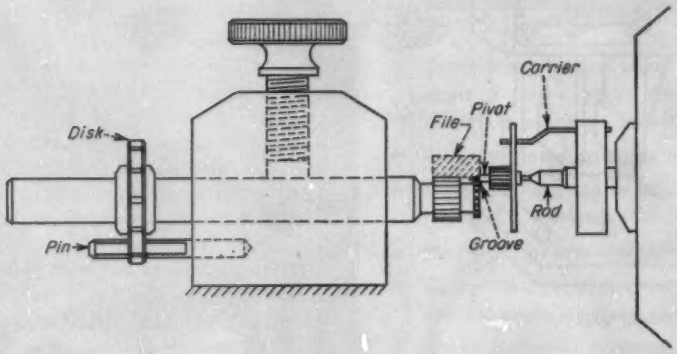


Drilled Plate Aids Layout Of Equidistant Holes

We often have to lay out a certain number of equally-spaced holes, and find that the exact distance between holes is an inconvenient measure. To speed such layout, the device shown, which uses a principle similar to that used by draftsmen, will give quick and accurate spacing, whether the dimensions are convenient or not.

The device is a bar which has been drilled with a number of equally-spaced holes of convenient size, the distance between the holes and number of holes being chosen to suit our needs. It helps to number the holes, starting from zero.

In use, two parallel lines are scribed through the end-points of the work line. Then the drilled strip is laid across the work, as shown, so the first hole of the strip is on the left line, and the hole corresponding to the number of parts into which the work is to be divided, on the right line. Points are then marked on the work, at each drilled hole, and the process is repeated with the bar switched to give points on opposite sides of the work line. Lines are drawn between corresponding points just found. The points where these lines cross the work line will be found to divide the work into the required number of equal parts. *John M Heath, Kenmore, NY*



Fixture Helps Polish Small-Diameter Pivots

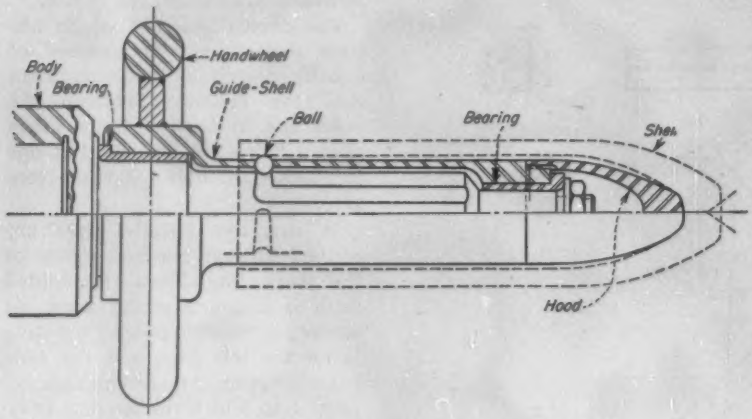
With this simple fixture, pivots of instrument gearing can be polished in an engine lathe in a few seconds, and highly polished surfaces can be obtained even on pivots as small as 0.040-in. diameter.

One end of the pivot rests in a small U-shaped groove. The other end is supported in a conical recess of a rod held in the headstock of the lathe. The gear is revolved by a small adjustable carrier which is fixed to the revolving rod, and rests in a gear tooth or similar recess in the periphery of the workpiece, providing turning torque.

Polishing is done by hand, by moving a fine-toothed file slowly over the work. The file should have two coarsenesses of cut, one for roughing, the other for finishing.

Twelve grooves, of different sizes, accommodate different-sized pivots in the working end of the fixture. At the other end of the fixture, an indexing pin rests in a slotted disk, each slot in the disk corresponding to a different size of pivot-support groove.

Because of the small diameter of the work, it is necessary that the work be turned at a very high rpm, in order to provide high surface speed, to get a good finish. *Giroa Herzl, Haifa, Israel*

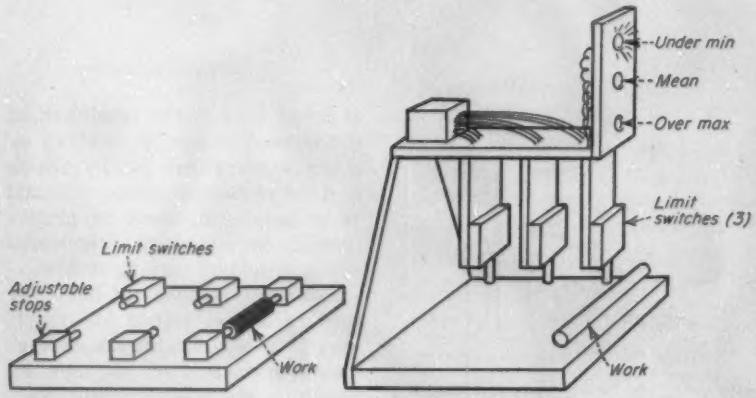


Ball-Bearing Locks On Fixture Aid Turning Of Ordnance Shells

We have found that this eccentric-ball-bearing fixture is very helpful in turning the OD's of small calibre shells. The basic principle uses three 120°-spaced balls in eccentric slots, which lock the work in place when the piece is turned.

To use the fixture, the handwheel end is mounted in the spindle of the lathe. Then the drawn shell is loaded onto the fixture, being pushed into place and held by the tailstock center. A sharp turn of the handwheel of the fixture forces the steel balls against the ID of the shell, aligning the work. Turning is now begun. It will be noted that as cutting force increases, the balls are forced harder against the work, and clamping pressure is raised to resist the tendency of the work to stop rotating because of tool force.

The main body of the fixture has two sleeve bearings for the guide-shell. The expanding arbor is covered by a hood which is shaped to fit the drawn shell closely, locating the nose of the shell accurately. A handwheel welded onto the guide-shell aids the operator in rapid clamping and unclamping of the work. *D G Nolle, Montreal, Canada*



Precision Limit Switches For Production Gaging

An inexpensive production gage can be made from three or more precision limit switches set up as shown. The gages are set for high and low limits, with an added gage to show whether that the part is above or below the mean.

To insure positive action of the device, the "Under Minimum" light can be connected so it stays on (as shown), unless a within-tolerance part is pushed through and contacts the switch, turning the light off. This safeguard will prevent attempted use of the gage if, for example, there is no power to the gage, or, for some other reason, the gage is not working properly.

Thus, when a part is pushed through the gage, the "Under Min" light will go out, and the other two lights will stay off, showing that the part is between the low limit and the mean dimension.

If the part is on the high side of the mean, that light will turn on, and the "Over Max" light will not flash. Of course, if the part is over the high limit, that light will also turn on.

There is at least one such type of switch commercially available for a little less than $2.00, reported to be accurate to within ±0.0001 in. in a test run of several hundred thousand trials.

The switches can be set with either an inside micrometer, or, if limits are close, size blocks can be used. *S Kopacz, Jersey City, NJ*

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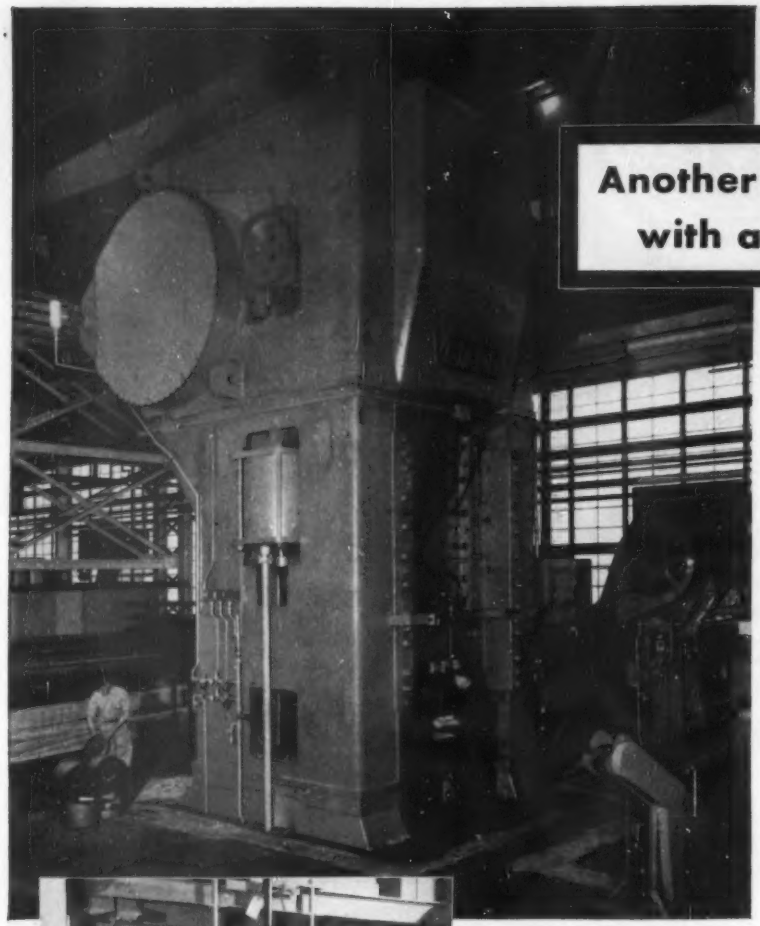

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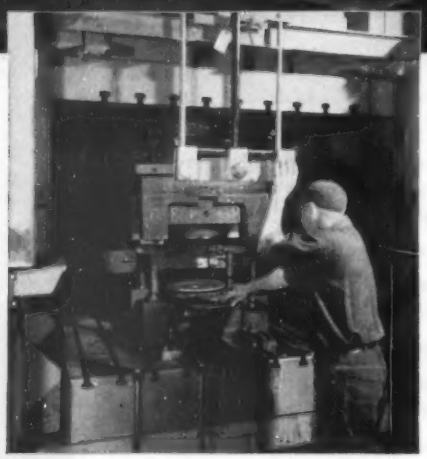

Close-up of the die space in this 2500 ton Verson Full Eccentric Press showing the part being formed.

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The press shown above is typical of Verson Full Eccentric Presses. It is being used to form heavy flywheels on a high production basis. Note the long, extra heavy special gibbing and rugged construction throughout—assurance of the accuracy and uniformity required in a part like this.

The Verson Full Eccentric line includes models with one, two and four point suspension in capacities from 100 tons up. Further data is given in Catalog G-52. Write for your copy.

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Machining Titanium With Coolants...I

SOURCE: United States Air Force Machinability Report, Vol 3, 1954. Published by the Curtiss-Wright Corp, Wood-Ridge, NJ.

When titanium is machined, tool life is adversely affected by temperature rise. With HSS tools, temperature rise is not extreme as the speed increases and is not serious with increasing feed. But with carbides, the temperature rises rapidly with speed, and is likewise affected by the feed rate. Therefore, basic research was performed with various coolants and methods of application in an effort to reduce temperature rise and increase tool life. Results of the investigation were limited by the time and amount of material that could be consumed in testing, but do give some basic data on how titanium behaves.

Inert-Gas Blanketing. Part of the high cutting temperature is traceable to abrasiveness. Titanium has an affinity for oxygen, and complex titanium carbides and possibly intermetallic compounds containing oxygen are highly abrasive. To avoid further absorption of oxygen during cutting, tests were made with an inert-gas blanket surrounding the work-tool area. Results were negative with argon, hydrogen, nitrogen and Freon-12. In fact, Freon supported combustion of the titanium.

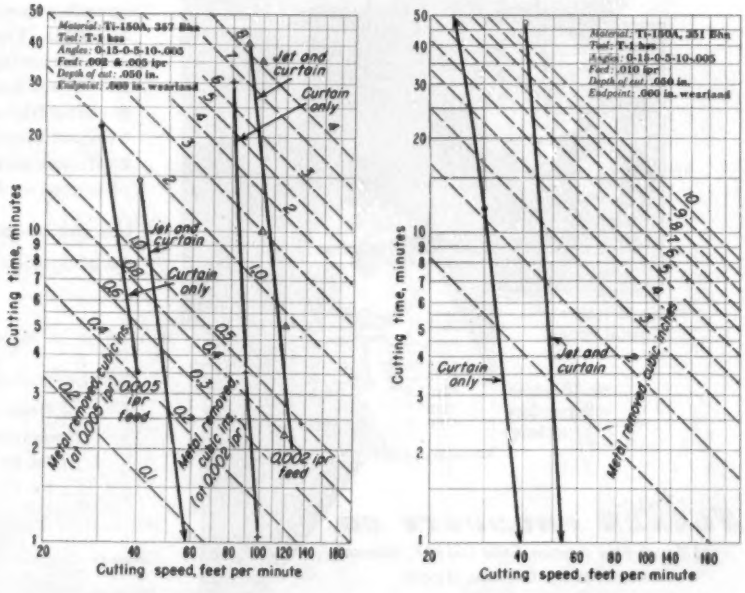
Pre-Chilling. When the workpiece was pre-chilled to –90 F, no practical gain in tool life was obtained with carbide and only 20% with HSS tools.

Accelerated Tests. Although in machining titanium it is known that a "straight" tungsten carbide is superior to more heavily blended tool materials, accelerated tool-life tests were made with seven grades of carbide for comparative purposes. In addition five types of HSS were likewise tested. The results are summarized in Table I.

High-Pressure Jets. In any machining operation where cutting speed is upwards of 50 fpm, it is extremely difficult to get a cutting fluid close to the work-tool interface. A possible solution is the use of a high-pressure pump and small nozzles. With the nozzles carefully aimed at the flank clearances and possibly at the spot where the chip curls away from the tool face, the high pressure can get the cutting fluid fairly close to the area of work-tool contact.

The unit tested, "Hi-Jet," works on the principle that the oil mist from the jets, upon striking the hot surfaces, partially or completely vaporizes; and is therefore able to penetrate surface irregularities between chip and tool and form a fluid film at the interface. An overhead (low-pressure) oil curtain is also provided to catch the stream of oil when the tool is backed off and to smother the smoke and vapor generated in cutting.

The nozzle orifices are about 0.010 in. dia. The oil pressure is 500 psi and the flow about ¼ gpm. Flow from the curtain is about 12 gpm, low pressure.



JET COOLING plus curtain cooling consistently permits a greater cutting speed for equal tool life at any of the three feed rates employed when turning Ti-150-A alloy. Jets used special Gulf Hi-Jet oil

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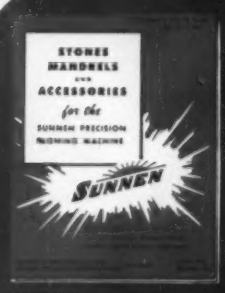

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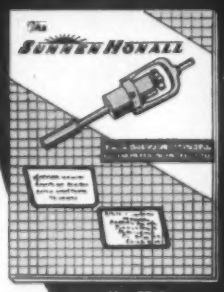

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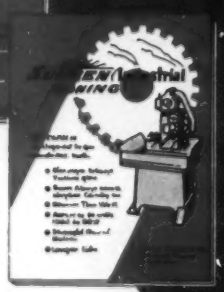

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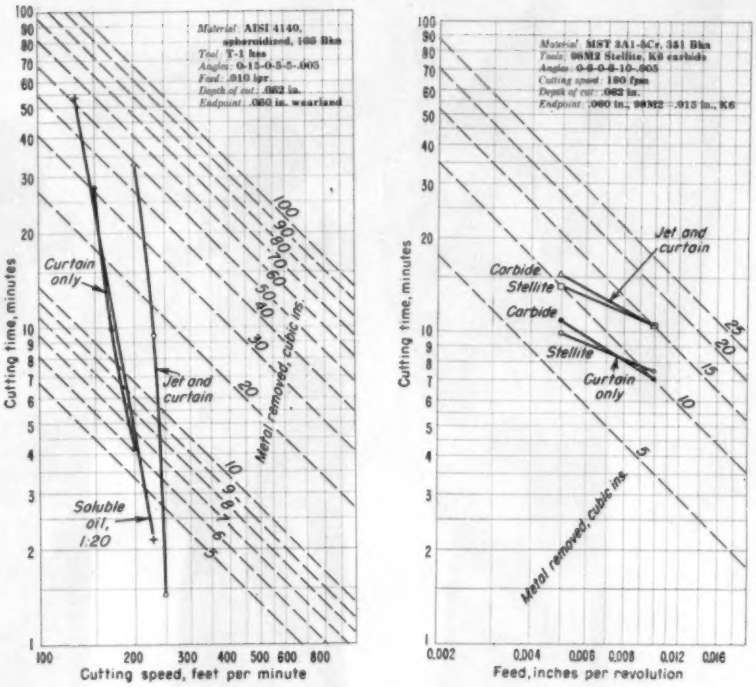
Machining Titanium With Coolants...II

To check performance of the unit against existing data, AISI 4140 steel in the spheroidized condition was first used. It was found immediately that adjustment of the jets is extremely critical. The jets must be aimed exactly at the cutting edge and must wet the cutting edge along the entire depth of cut. Original tests were made at 0.062 in. depth of cut. This was later reduced to 0.050 in., because two jets did not give sufficient coverage for the greater depth of cut.

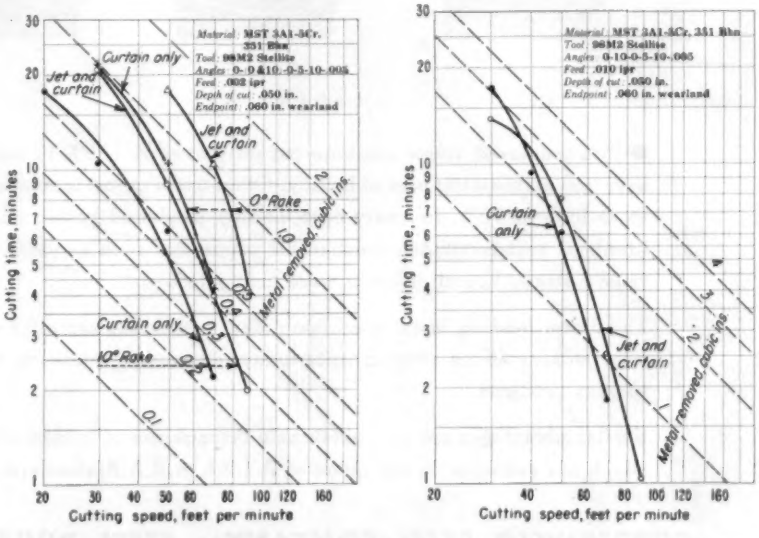
Three tool-life curves with 4140 using a HSS tool are given. The first shows machining with a soluble oil at 1:25 concentration. The next shows the effect of using Gulf's special Hi-Jet oil from the curtain only as a flooding coolant. The third shows the combined effect of curtain and high-pressure jets. Soluble oil applied conventionally (flood) and the overhead curtain alone proved to give virtually identical results. Addition of the jets afforded a considerable gain in tool life for constant cutting speed. In terms of faster production rate without sacrifice in tool life, cutting speed could be increased from 150 to 200 fpm. Subsequent to the testing reported here, a soluble oil is now under development for use in the Hi-Jet to eliminate objectionable smoke.

With HSS tools, about one-fifth of the tests showed the jet to be inferior to the curtain alone; with carbides, only one-half the tests indicated an advantage in using Hi-Jet. Only those showing Hi-Jet to advantage are illustrated by tool-life charts.

CO_2 as Coolant. Liquid CO_2 was supplied through a spray nozzle having a 0.016-in.-dia orifice, to the tool in three ways: first, direct the jet at the clearance flank beneath the cutting edge, second, the jet on the tool face; finally, jets were simultaneously applied above and beneath. Applying the gas beneath



APPLICATION OF JET COOLING improved machining performance on AISI 4140 (left) and also when machining MST 3A1-5Cr with carbide and Stellite (right)



ZERO RAKE on Stellite tool affords better tool life than 10° rake (left). Tool life is improved by jet plus curtain cooling (right)

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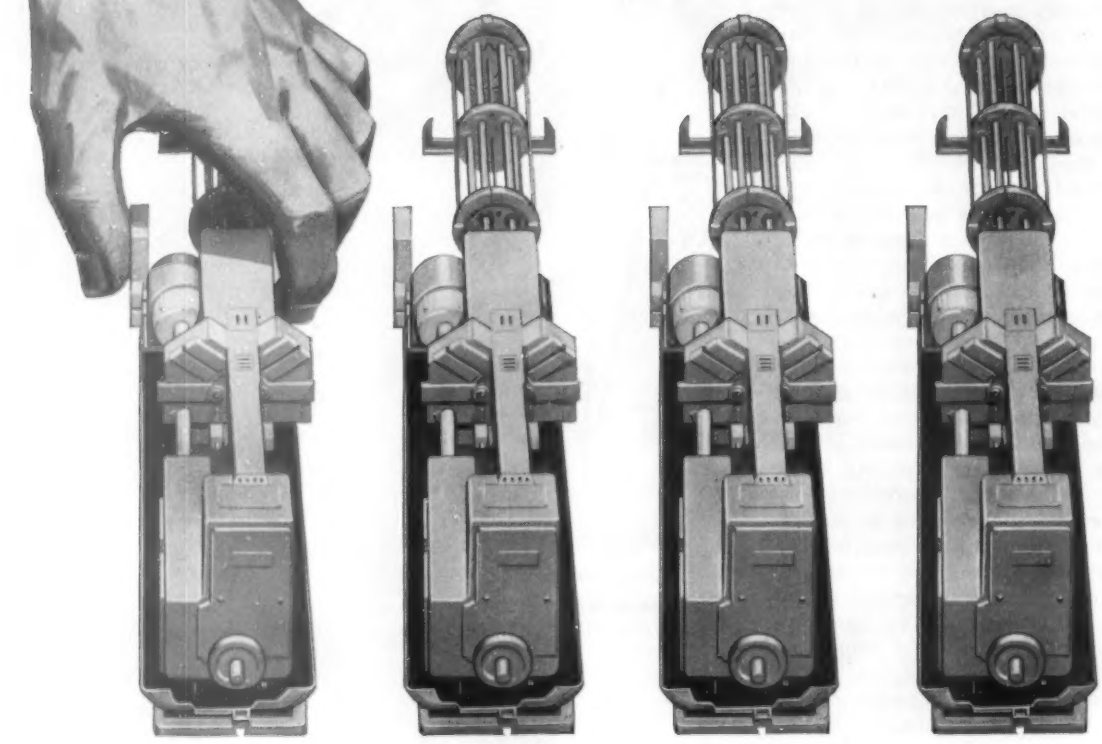

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Machining Titanium With Coolants...III

was distinctly inferior and no advantage in using two jets was found.

Feed runs at 180 fpm with a K6 carbide tool on MST 3A1-5 Cr indicated a very promising gain in tool life in using CO_2 over dry cutting. (Use of coolants with carbide tools does not much increase tool life and most of these carbide tests have been run dry.) At a feed of 0.008 ipr, it was possible to cut almost 6 cu in. in about 6½ min. for the usual 0.015-in. wearland. This is almost three times the production obtainable dry. But liquid CO_2 was being consumed at the rate of about 60¢ per hr.

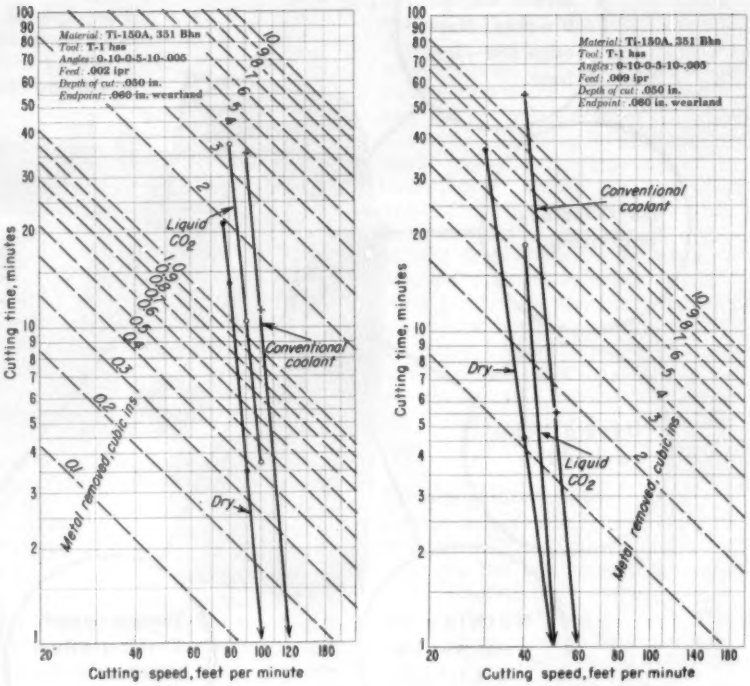
With a Stellite 98M2 at 50 fpm it was possible to cut 4 cu in. in about 8 min. at 0.015 ipr.

Where high-speed tools (18-4-1) were used on Ti-150A with speeds ranging from 30 to 120 fpm, liquid CO_2 fell about midway between dry machining and machining with a conventional chemical coolant in its ability to prolong tool life.

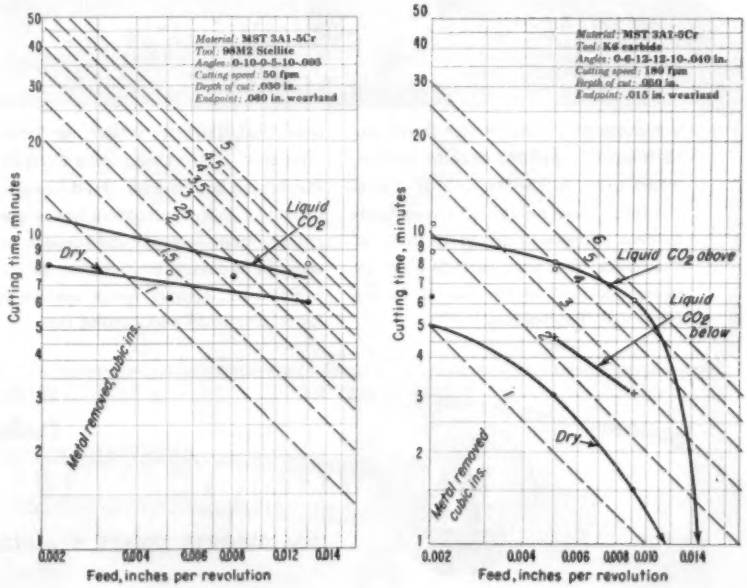
Table 1 . . Accelerated Tool-Life Tests

TOOL MATERIAL	TOOL LIFE MIN——SEC	MIN——SEC
K6*	1——15	2——00
999†	2——15	1——30
883†	2——45	1——15
44A†	2——00	1——15
779†	1——45	——15
55B†	——10	—— 5
905†	3——00	2——15
	HIGH-SPEED STEELS	
T-1-A	1——30	
T-S-X	4——10	
M-2-A	1——40	
T-15-A	12——00	
T-5-N	10——15	

First column: 350 fpm and 0.009 ipr; second column, 450 fpm and 0.005 ipr
†First column: 300 fpm and 0.009 ipr; second column, 220 fpm and 0.009 ipr
High-speed steels: 55 fpm and 0.009 ipr



CO_2 is not as good as a conventional chemical coolant when turning Ti-150-A with HSS tools, and has no effect on surface finish



CARBIDE TOOLS have a considerable gain in tool life when CO_2 is used, compared to dry cutting. Stellite is affected less

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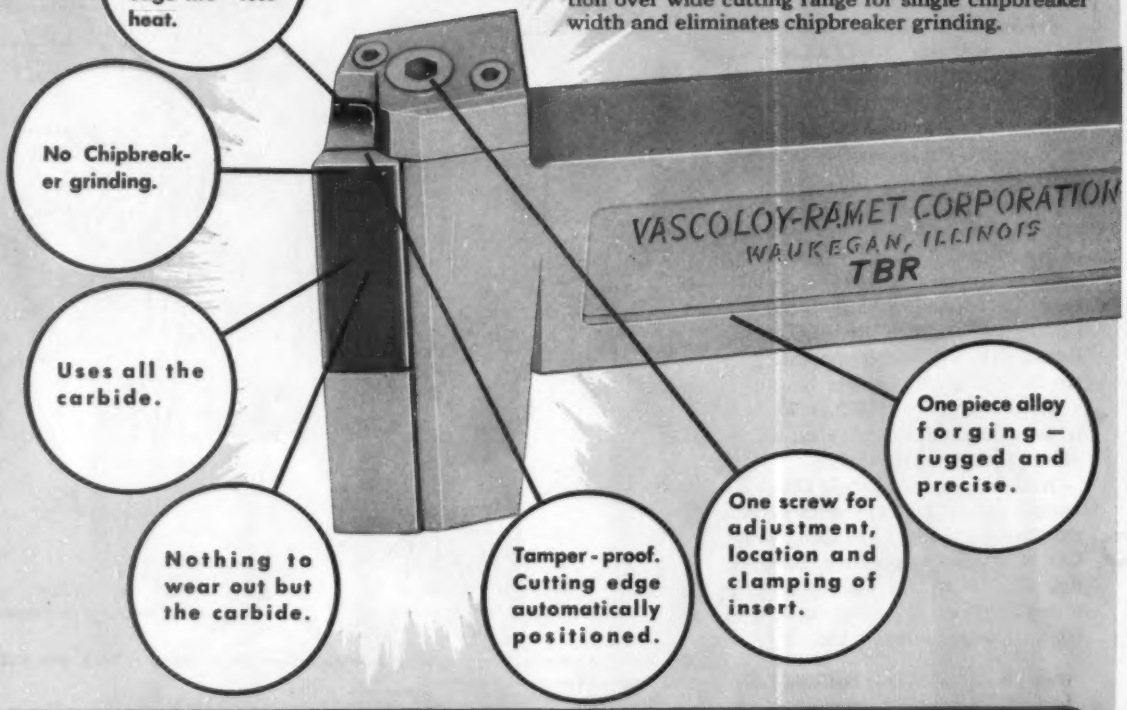
The superior design "Built-In" carbide chipbreaker of extreme versatility provides correct chip formation over wide cutting range for single chipbreaker width and eliminates chipbreaker grinding.


Versatile Carbide Chipbreaker. More edge life—less heat.
No Chipbreaker grinding.
Uses all the carbide.
Nothing to wear out but the carbide.
Tamper-proof. Cutting edge automatically positioned.
One screw for adjustment, location and clamping of insert.
One piece alloy forging—rugged and precise.
VASCOLOY-RAMET CORPORATION
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Cut Carbide Inventory By 50% Or More With NEW V-R Inserts and Blanks!

V-R STANDARD LENGTH 1½" LONG INSERTS GIVE YOU ADDED CARBIDE LENGTH, when used in the New V-R Toolholders. New design of these toolholders permits using up to 90% of the insert. Cut your carbide costs by using standard length inserts in the New V-R Toolholders.

NEW "HALF-LENGTH" INSERTS ¾" LONG COST LESS . . . GIVE MAXIMUM CUTTING. Machining begins with "Half-Length" inserts in V-R Toolholders where machining stops with standard length inserts in ordinary toolholders. Lower initial cost, greater usage results in lower inventory and cutting cost.

NEW "THROW-AWAY" BLANKS ELIMINATE ALL GRINDING. Designed to use all cutting edges on both ends without grinding results in the lowest cost per cutting edge obtainable. Available either as: PRECISION, ground all over and used where precision indexing is desired, or UTILITY, ground on two faces only.

DESIGNED AND MANUFACTURED BY

Write Today For New Toolholder Catalog VR-435

VASCOLOY-RAMET CORPORATION

804 MARKET STREET, WAUKEGAN, ILLINOIS

Talking Shop . . .

Lubricant in That Gold

WE'VE HEARD OF PEOPLE who sometimes felt they were using gold as lubricant when they got the bills, but now we've learned of someone who really is. Philips Laboratories, Irvington, NY, has patented the Porphil process for machining high-density sintered tungsten. Conventional tools and machines do the job, but to prevent tearing of the sintered ingot it must first be impregnated with a wetting agent with which it doesn't alloy (such as gold or copper).

Machining is relatively easy up to densities of 83%, and can be done to 90%. By previous methods a partly sintered 55% density was the best that could be machined. The gold or copper serves as a filler, a lubricant, prevents tearing out of particles, or burnishing and excessive tool wear. After machining, the impregnating metal is melted out. Temperatures for adding and removing the filler are well below sintering temperatures, so do not cause distortion or change physicals of the tungsten.

Bath Sulfurization

SULFURIZATION by salt bath for treating steel and cast-iron surfaces gives a high resistance to wear and seizure. Piston rings, cylinder levers, HSS drills, and bearings of various types have shown greatly improved performance after treatment.

Drills, after sulfurizing, maintained cutting edges nearly three times as long. Piston rings, after treatment showed only 1/16 of the wear of untreated rings. Possibly some increased life results from more complete transformation of residual austenite during the long stay in the bath at 1076 F. Some may also be a result of nitrogen absorbed from the cyanide. "Bedding-in" is considerably reduced, say the foreign developers, because of film characteristics produced on metal surfaces. Also, the new treatment produces a relatively deep penetration of sulfur in superficial layers of the part, thought to be superior to the thin films produced by lubricants.

Salts may be a mixture of 95% cyanide and 5% sulfite, which gives an active sulfur content of 1.27%. Treatment would be given in place of, or subsequent to, tempering. It follows that steels tempered below 1076 F will be softened. However, even with a loss in hardness, performance is sufficiently good to justify treatment. For steels tempered above 1076 F, hardness is not appreciably affected by sulfurization.

Concrete Dies

BACK IN 1952, in our 75th Anniversary Issue, we told you that one company was using concrete dies for stretch-forming magnesium, even though they denied it at the time. Reinforcing rods cast in the dies doubled as resistance heaters. The company, one of the large aircraft firms, has since abandoned the process for production dies, though they continue it for development dies. Trouble was that runs were short and frequent handling of the dies resulted in chipped corners. Main advantages of the dies were economy and resistance to size change. Plastic resins of the epoxy type have the same size stability, are easier to handle, and don't chip like concrete—but they aren't as cheap to produce.

Trouble in Transfer

INCREASING USE of elaborate automatic machine tools, particularly transfer machines, has shown the importance of having every component adequate, according to R W Kowitz of Ford, at the Westinghouse Machine Tool Electrification Forum. A single control device, such as a limit switch, a relay, or a timer, costing $10 to $30, may fail and stop a $150,000 machine. In some cases, these failures are the result of misapplication—use of an aircraft-type switch or hydraulic valve, designed for 100,000-cycle life, on a production unit which cycles 500,000 times a month, for example. Another problem is faulty design—parts located so they function well when new, but are soon thrown out by grease, oil and chips. This is particularly true of limit switches and gravity-operated devices applied at too high or too low a pressure and hydraulic systems that soon leak.

Carbide-plated Dies

FORD IS PLATING some draw dies with tungsten carbide. On one hand-brake part, die life was averaging 40,000 parts. Coating the wear surfaces of the dies by the Linde Flame-Plating process is reported to have increased die life to 250,000 parts. Application of the coating does not raise die temperature above 400 F, so there is no loss in physical properties of the die.

Rag Washer

"USE A CLEAN RAG" is a common instruction around the average shop, and maintaining an adequate supply of clean rags is a problem in many plants. In Denver, they cost about 25c a lb, so Gardner-Denver Co has installed an automatic washing machine in the power plant. The night engineer utilizes odd moments to load dirty rags in the washer.

MACHINE TOOLS: New Models for New Markets

Machine-tool redesign to meet "the new rapid pace of product redesign that is sweeping all industry," long-term stabilization of the industry, customer relations, and Washington problems, were the chief topics of discussion as more than 350 top executives of firms representing over 85% of the nation's machine-tool output took part in NMTBA's 52nd Spring Meeting in Chicago

CHICAGO—If the machine tool industry is to cash in on the enormous potential replacement market it must do five things, Herbert L Tigges, NMTBA president, and executive vice president Baker Brothers, Inc, told the 52nd Spring Meeting of the National Machine Tool Builders Association here May 5-7. They are:

- Recognize that selling in the old-fashioned sense is not enough, and that trained engineers must do the job.
- Sell on a basis far broader than mere direct labor savings.
- Give salesmen classroom lessons in tax arithmetic.
- Take full advantage of advertising and public relations.
- Make a big sales push in connection with the excellently timed Machine Tool Show.

Mr. Tigges said that the industry has a big chance because "certain factors exist in a combination which we never had before." These factors: a continuing high level of industrial production; greatest accumulated obsolescence in production equipment in history; competitive situation among customers making them cost-conscious; continuous rather than momentary defense needs; and a more understanding attitude on the part of government.

"Keep Pace With the Times"

First requirement of machine tool builders today is to keep pace with the times, Mr Tigges remarked. New models, new designs, new materials, new processes, entirely new products are mushrooming on the market. Is the machine tool industry ready for them? "All I'm trying to say," he stressed, "is that we must speed up our own rate of redesign to meet the new rapid pace of product redesign which is today sweeping all industry."

All machine tool builders should cultivate good relations with their Congressmen so that the industry can organize effectively and quickly in emergencies, M A Hollengreen, NMTBA first vice president and president Landis Tool Co and Gardner Machine Co, said. Builders also should have the same sort of relationship with top men in the executive branches and agencies of government.

In dealing with government people, however, builders should present specific information on the problem at hand. This information should relate to wide industry or public interest and not merely to one company, Mr Hollengreen emphasized. The machine tool industry has gained respect in Washington by presenting its problems largely through executives from individual companies rather than through lobbyists. Yet not all builders seem aware of the importance of the industry's never-ending job of educating the administration and Congress in the industry's problems. Mr Hollengreen paid tribute to the work done by the American Machine Tool Distributors Association under the guidance of Ray Vidinghoff on behalf of a more intelligent depreciation policy. He likewise praised the efforts of Mr Berna and the NMTBA staff.

Government Relations

Everett M Hicks, chairman government relations committee and vice president Norton Co, backed up Mr Hollengreen's plea that every builder make it his business to discuss his industry, its nature and its problems with his Congressmen and Senators. The builder should go even further and write his Congressmen his opinions on current legislation. Mr Hicks told members that the committee is trying to keep them better informed about pending legislation and regulations as well as about the committee's objectives.

If HR 8300 (Internal Revenue Code of 1954) is not amended to permit optional depreciation, it should allow taxpayers to depreciate production equipment by either the declining-balance method or the sum-of-the-digits method. The latter is a well-recognized decreasing-charge accounting method allowing complete depreciation of property over its theoretical useful life, getting rid of the problem of carrying some residue *ad infinitum*. So spoke Richard W Banfield, chairman of the tax policy subcommittee and executive vice president Niles-Bement-Pond Co.

Sum-of-the-Digits Method

Here is how the sum-of-the-digits method works, Mr Banfield said: Where the estimated useful life is five years, the sum of the digits is 15 (1 plus 2 plus 3 plus 4 plus 5). For the first year, 5/15 of the cost would be permitted as depreciation, for the second year 4/15, and so forth.

Mr Banfield outlined his committee's recommendations to Congress and the provisions now in HR 8300. Lack of a terminal date on depreciation under the declining-balance method is a serious defect in the current bill. There is substantial doubt too whether, under the proposed law, a corporation can accumulate funds, without being subject to a penalty tax, to expand into a new unrelated business. Mr Banfield said that NMTBA has urged amendment of HR 8300 to exempt companies from the surtax under such conditions.

Employee Relations

"Our first job is to make sure that our own employees understand the nature and the function of machine tools," Louis Polk, NMTBA second vice president, and president Sheffield Corp, said, in discussing the industry's educational problems. "Our next job is to make sure that people in our own communities, where we have our plants, under-

stand what machine tools do to raise the standard of living and to create employment."

Then there is the problem of giving all potential users of machine tools a truer understanding of what machine tools are and what they do, Mr Polk declared. Beyond that, it is important that high school and university teachers understand the functions of machine tools in our economy and regard the machine tool industry as one of opportunity for young men completing their engineering education. And the so-called "thought-leaders" in the community should not be overlooked. Part of this continuing public relations job can be done by NMTBA, but, Mr Polk emphasized, "the major portion depends upon your own individual efforts, conducted on a grass-roots basis within your own communities."

Don't make the mistake of writing off your foreign markets. That was the advice of Ralph J Kraut, chairman foreign affairs subcommittee and president Giddings & Lewis Machine Tool Co. Though the ratio of export sales to the total has slipped badly, that's no reason to believe that substantial orders for US machines may not be coming from abroad.

Mr Kraut brought out that the financing of export sales is the biggest factor of all. If US builders could compete in Latin America with the same credit help from the government that builders in Europe get, US machines could be sold in larger numbers, despite their higher prices. Our government, incidentally, should stop its handouts of money abroad for aid to European machine tool builders. Mr Kraut listed and commented on the various obstacles to foreign trade—duties and import restrictions, lack of currency convertibility, US government's policy of encouraging foreigners to buy non-American machine tools with US funds.

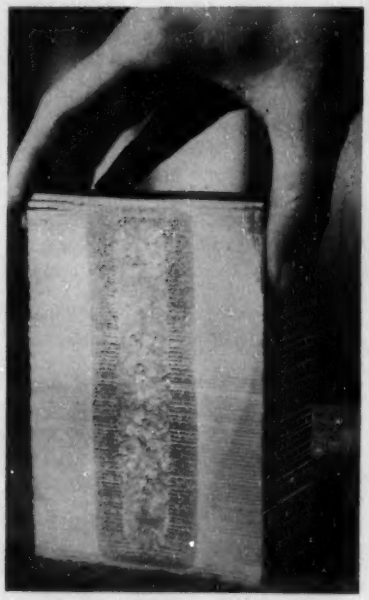
Defense Department now has a new recorded inventory of 288,000 government-owned machine tools, Ralph S Howe, chairman subcommittee on permanent defense capacity and president New Britain Machine Co, reported. This, however, does not represent all the machines owned by government agencies.

Sale by auction of government tools declared surplus because they are not needed in any current defense program is one of the most critical problems, he declared. These machines should not be offered for sale until a more thorough analysis is made, otherwise the services will suffer from gradual disappearance of their tool reserves.

Mr Howe expressed opposition to leasing machine tools for civilian work, citing these reasons: (1) it would wear out the government's reserves; (2) it would scatter machines and make it impossible to assemble them at needed spots quickly in an emergency; (3) it would weaken the machine tool industry; (4) it would

(*Continued on page* 164)

Liquid-coolant process spotwelds . . .



89 sheets at once

Spotwelding 6-In. Titanium Stack

6-IN. TITANIUM SPOTWELD—Stack of 89 sheets of scrap titanium was spotwelded by Glenn L. Martin Co. to form titanium nugget from which small aircraft parts or hardware can be machined. By making the weld in a tank with work submerged in cooling liquid, welds up to 6-in. in titanium and 3-in. in stainless steel are possible. Titanium sheet is deoxidized in 2% hydroflouric, 10% nitric acid solution, welded in a Sciaky 3-phase 400 kva spot-welder with Mallory 3 electrodes, 2½-in. dia, 20-in. radius. Pressure is 19,500 lb and weld time 15 sec. With seam, instead of spot, welding long ingots could be produced. Martin engineers think large titanium wing skins could be laminated to roughly the shape required, reducing machining time and scrap; complex turbine wheels could be built up by the same method. Test specimens have had properties well above minimum specifications for titanium

MACHINE TOOLS (Cont'd)

mean more government in business and replace private venture capital; (5) it would become a political football. Pentagon has pledged that leasing will be done only when it is strongly to the advantage of the government to preserve the "package."

Build "Elephant Tools" Now?

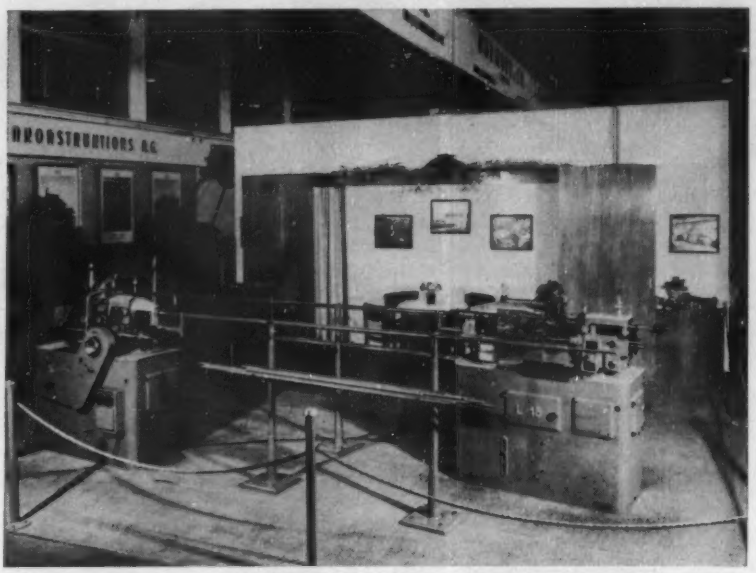
"Elephant tools" should be built now at government expense to be ready in case of war, Mr Howe stated. He stressed that building whole plants to increase the nation's capacity to produce elephant tools was not contemplated by the Vance Report, which instead recommended US purchase of "hard-to-get" machines to have them immediately available if a military production program arose. He pleaded for orders to be placed with a producer of stretch presses now about to go out of business, since capacity for such tools will be needed in wartime. The same argument holds, he said, for skin and spar millers, large planer-type millers, very large planers, large vertical and horizontal floor-type boring mills, and very large gear hobbers. All of these types would be required for the Navy "where a fabulous deficiency exists in case of war."

Most Promising Markets

The automobile industry, modernization plans of the metalworking industry generally, and US defense plans provide the three most promising machine tool markets this year, Tell Berna, NMTBA general manager, said. The extent to which modernization will go hinges on the ability of machine tool builders' sales engineers to persuade customers to buy new machines after Congress liberalizes depreciation allowances. The NMTBA-AMTDA sales conferences held each summer have given the industry a sizable number of sales engineers who understand depreciation and can discuss it with customers.

Restore Vance Plan?

The Senate appropriations committee should restore to the Defense Department budget the money necessary to initiate the Vance program in an orderly and intelligent way, Mr Berna declared. This country will be in desperate straits if on the outbreak of war "this tiny industry must meet suddenly an enormous demand for machine tools."



ONLY EXHIBIT OF AUSTRIAN-BUILT SINGLE-SPINDLE AUTOMATICS was this display by Pongracz at the Vienna Fair. These machines are available in 10, 15, 20, 25 and 42-mm sizes. One model has cam-operated compensator

German Machine Tools

Already masters of Austria's $4-million machine-tool market, German builders made a strong bid for bigger game — the eastern European market—at the Vienna Fair

VIENNA — Germany's traditional "Drang nach Osten" (Drive to the East) was evidenced at the recent Vienna Fair by the preponderance of German-made machine tools. Some 20 US companies were represented, by name only, against 758 German, (many actual machines on show) and a few Swiss, French, and Austrian.

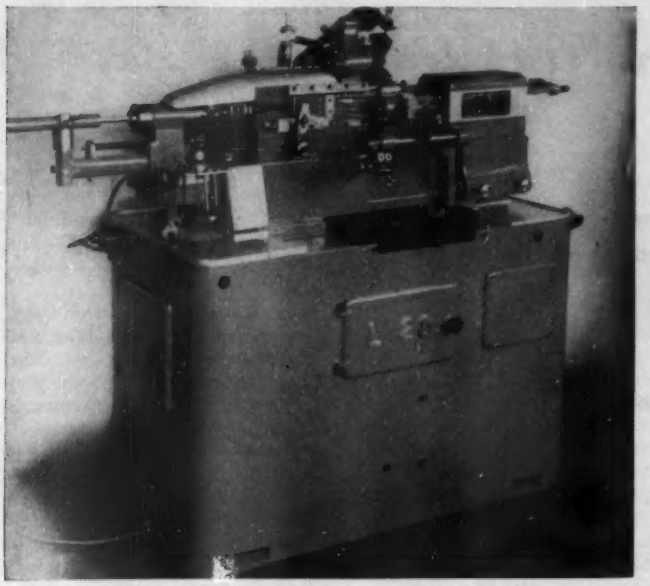
Austria's machine tool imports last year amounted to $4 million, of which Germany supplied more than half. American machines, financed chiefly by dwindling dollar grants and loans, dropped to a quarter of the total. Of the rest, Switzerland had the largest share, with Sweden, France, and Britain well in the rear.

Offer Long Credit Terms

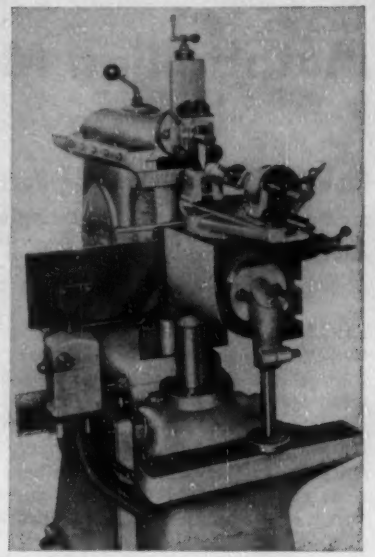
Aside from tradition and the advantage of a common language, the Germans have made big strides by offering long credit terms, unusual service and spares facilities, and special price concessions. As ERP dollars faded out, they moved into leading position by vigorous promotional activities and, during the past two years, their exports to Austria have shown an amazing increase.

Because of the nature of its industry, Austria's chief needs are for the more basic types of machine tools, suitable for use in its small plants employing, at most, a few hundred men. For the most part, these needs can be met by the country's own machine tool industry, which consists of 30 companies with a total of 1500 workers. Largest of these is Heid, with 600 men, specializing in precision lathes up to 25 ft between centers and 16-in. swing. Large lathes, presses, grinders, and other heavy equipment are also produced by the nationalized iron and steel works at Linz.

The only Austrian-built single-spindle automatics shown were the Pongracz machines in five sizes, from ⅜ to 1½ in. The largest has four cross-slides and one longitudinal



PONGRACZ 20-MM SINGLE-SPINDLE AUTOMATIC has eight spindle speeds, from 660-3000 rpm; has three cross slides, one longitudinal slide, and a three-spindle drill head



AUSTRIA'S ANDERLE exhibited this mechanical shaper with hydraulic copying attachment. Table can be rotated 360 degrees, and has provision for vise on adjacent sides

Dominate Vienna Fair

slide, and a three-spindle drilling head. The longitudinal slide is fitted with a cam-operated compensator which permits several diameters, set independently, to be turned on one workpiece with a single tool.

An unusual machine was the Austrian Anderle shaper, in 8 and 11-in. stroke, equipped with a table that can be rotated through 360° and with provision for a hydro-copying attachment. Most unusual feature of these machines is the provision of special heads for vertical milling and slotting which are interchangeable with the ram in its prismatic guides. The milling head incorporates a ½-hp motor with five speeds on the vertical spindle up to 3920 rpm, selected by changing pulleys of the V-belt drive. Horizontal milling is effected by rotating the table 90° and manually traversing the head in the ram guides with the handwheel.

The vertical slotting head with its own ¾-hp motor has a stroke of 3 in., with six speeds from 23 to 210 strokes per min. Anderle, with 35 employees, is making five or six shapers a month, plus a small universal milling machine and a new toolroom universal miller. A substantial part of the company's production is being exported to Brazil, Yugoslavia, and Germany.

Other Austrian machine tool builders include Krause (piston pin and cylinder fine-boring machines), Koenig and Bauer (centerless grinders and small turret lathes), Ronzal (threading and boring machines), and Scheissl (cold saws and small millers).

Austria Steyr Combine

Most notable exception to the small size of Austrian industry is the Steyr combine which is not only the largest metalworking industry, but is to a large degree self-contained. It includes four plants in Steyr and the Puch motorcycle works in Graz. Altogether, the concern employs 13,000 people and operates 10,000 machine tools. One of the plants is devoted to the production of machine tools entirely for the company's own use.

The Puch plant is said to be one of the most modern in Europe and, with the exception of rubber parts, produces all components, including tubing, wheels, electrical equipment, chains, and carburetors. Bearings and cylinder castings are from Steyr.

UNIVERSAL MILLING MACHINE, also exhibited by Anderle, has spindle head that can be rotated in two planes, and spindle speeds in seven steps to 3900 rpm

Mothballing Machine Tools at Ford

What to do with $40 million worth of US-owned machine tools and tank-building equipment when your contract phases out? Here's how Ford solved the problem

LIVONIA, MICH—When Ford Motor Co began phasing out M-48 tank production, the question of what to do with $40 million worth of government-owned equipment became a matter of overriding importance, since Ford itself owns the 1.5-million sq ft plant here and wished to convert it to automatic transmission production immediately.

Program Almost Completed

The answer is Ford's layaway program, now practically completed, entailing building a warehouse that can house the entire defense package of 5500 major items of machinery, fixtures and equipment, plus about 15,000 gages and tooling items. And equipment used by subcontractors had to be retained to keep the defense package intact. Sample subcontractors' item: 227 cranes.

The building contains 300,000 sq ft of floor space, plus 100,000 sq ft of flat slab for outside storage of non-deteriorating items. The building is relatively well sealed and has a dehumidification system that can maintain a relative humidity of under 45%. No heating is provided.

Machine-Tool "Cocoon"

In effect, the building itself serves as a "cocoon," and individual cocooning or shrouding of machinery is not needed because rusting is impossible. The building is divided into three sections, each of which can be sealed off from the others.

As tank output eased off, each machine was cleaned and preserved internally and externally, then dismantled and removed to the warehouse. Here are some of the improvisations that speeded up the mothballing process:

- Precision tools and gages are preserved with a hot-dip application of strippable plastic, meeting specification JAN-C-149, Type II. This preparation acts as a greaseproof, moisture-vaporproof coating, and as a cushion against mechanical damage. And, says Ford, it's cheaper than light oil.
- Wherever possible, tools, gages, fixtures, dies and jigs are laid up on metal storage racks, bin boxes and tote pans that were used in the tank plant and have to be stored, too.
- Ford saves up to 80% in floor space by using stackable storage racks and bin boxes. Stacked 4-5 deep, the racks leave space between containers for circulation.
- Record-keeping involves use of a process sheet, on which is recorded make and model, Ordnance tag or identification number, operation number and description, machine tools required for the operation, tooling and gages. Where necessary, it shows special material handling equipment.
- Each article is card-cataloged, with identifying number, description, part number and operation for which intended, and warehouse location shown.

Army Ordnance officers won't say how fast the package could be put back into operation, but will say the plan permits peak production to be achieved in half the time previously needed.

Cost of the warehouse itself is estimated at $1.2 million, and continuing costs of storage will be about $100,000 a year.

As tank production equipment was removed at Livonia, Ford installed machinery to manufacture and assemble automatic transmissions, minimizing employee layoff and speeding conversion to production of civilian goods. First transmission shipment is scheduled for sometime in July.

In this dehumidified "cocoon" . . .

tank-building equipment . . .

Laying away $40 million

FORD'S 304,000-SQ-FT WAREHOUSE will house upwards of 20,000 pieces of metalworking equipment, including such items as (below) positioners used to rotate tank parts during welding operations

POWDERED METALS: MPA Talks Shop

New developments, revealed at the Metal Powder Show, include rolling sheet from powders, flame plating steel parts with tungsten carbide, many others

CHICAGO — New applications and developments in powder metallurgy shared the limelight with exhibits of processing equipment at the 10th Annual Meeting and Show of the Metal Powder Association here.

Direct Rolling Method

One paper from Britain, by W D Jones of Powder Metallurgy, Ltd, London, described new methods of rolling powders directly into sheet or rod. In the extraction of some metals from ores, metal powder is the end product, and it is more economical to roll powders directly than to melt them first, Mr Jones said. He added that several sizeable plants are being planned in the US and Europe to extract metals in powder form, and that this should increase interest in spraying, rolling, and extrusion methods of handling copper, nickel and cobalt in powder form.

At the Sundwiger brass works in Kreis Iserlohn, Germany, sheet copper, phosphor bronze, cupronickel, and bearing alloys are produced directly from powder, Mr Jones said. This is also true of bimetallic strip for bearing, friction and electric-contact applications, he said.

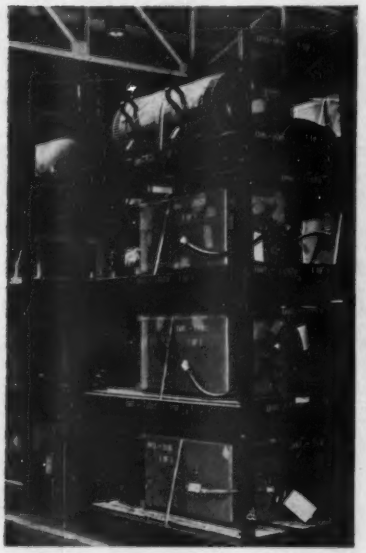
Other papers described the application of powdered metal parts in the automotive and aircraft industries, and powder metallurgy vs other precision forming methods.

In the latter field, C S Schroeder of Yale & Towne Mfg Co outlined such precision forming methods as die casting, investment casting, extruding, screw machining and shell molding, comparing them with powder metallurgy.

Flame-Plating Tungsten Carbide

Also described was a method of flame-plating tungsten carbide in layers of 0.002-in. to 0.010 in., by M A Teter of Linde Air Products Co, who said this can be done on any base metal to achieve superior wear resistance without the need for solid carbide parts.

Robert Steinitz of American Electro Metal Corp and Frank Zaleski of Frankford Arsenal described how pieforms in the shape of sintered iron powder cups are being used to produce cartridge cases, i.e, molded, sintered, coined and then re-sintered to supply pieces for drawing in experiments at Frankford.



welding units . . .

and machine tools will be stored

M-48 tank-building equipment at Ford Livonia

STACKING WELDING MACHINES in racks effected major savings in floor space, packing costs

ON SKIDS, READY TO BE MOTHBALLED in Ford's Livonia warehouse, this special machine tool for producing M-48 tank parts is given a final paint touch-up to protect its surface while in storage

The Continental:

Ford Aims to Recapture the Carriage Trade

(horseless, that is)

"Nearer to Rolls-Royce Quality than any US car" is what the re-born (Lincoln) Continental will be when and if it comes to life again next year under the aegis of Ford's Special Product Division

DETROIT—If and when Ford Motor Co's Special Product Division puts the famed Continental back on the road next year, it will be completely beyond the reach of the average motorist. Appearance, performance, quality, volume and price are all slanted toward one goal: prestige. So far as is known now, it will have no competition.

The Continental is reportedly taking shape in a long frame building that once housed the now-defunct Henry Ford Trade School. This is the home of Ford's Special Product Division, established last November under the general managership of William Clay Ford.

Similar Lines

A detailed description of the car is not permissible, but it might be said that admirers of the old Continental will have little trouble recognizing the new model. One suggested layout for initial advertisements would simply show a picture of the car and this message: "That's right. You guessed it." The modern version's lines, some company executives believe, should resemble the the earlier model's lines enough to permit instant identification.

The plastic and clay mockups, under close guard, are said to be inches lower than any current volume production car. Even so, engineers have provided more headroom and legroom than most present hardtops possess.

The old Continentals will not bear comparison with the new in performance. The early version, regarded by many as one of the handsomest autos ever built, didn't couple performance with high styling. Its big Lincoln V-12 was a touch on the sluggish side. Said one Detroiter, "I sometimes managed to get around the milk truck within three blocks."

The upcoming version should be more than adequately powered by an advanced and modified version of Lincoln's 1956 V-8, and probably would rate in the 240-hp area. Its transmission is expected to be the new Lincoln "Bellwood" transmission, due in 1955.

Production in 1955?

The new Continental is expected to go into production in the early fall of 1955. It is believed that annual output will be something under 3000 units—probably around 2500. Price, while still not pinned down exactly, will be around $10,000.

Peak production on a three-shift basis could probably amount to 7-8000 units a year, and there is reason to beileve that all of them could be sold, even though astronomically priced. However, it is believed Ford would be inclined to restrict output simply to retain its prestige value. Snob appeal necessarily would be a basic merchandising factor—with the Continental's very scarcity enhancing its position as the top US luxury car. Cadillac's present supremacy is in part founded on that theory. Cadillac expects an annual production capacity of about 160,000 units, although output of that many Cadillacs in one year is unlikely, because Cadillac limits output to sustain demand.

Moreover, Ford's new Special Products Division has a ready-made market of unknown depth. Ever since Continental production was temporarily discontinued in 1948, the company has been peppered with inquiries as to when it would again be available. This active public interest, plus insistent demands by the company's dealers, plus Ford executives' awarness that the Continental had and still has large appeal, were the ingredients that gave the Continental new life.

The Special Products Division, which almost certainly will be renamed the Continental Division, will have a distribution problem on its hands. A year's production in 1956 would supply each Lincoln-Mercury dealer with only 3 Continentals, assuming L-M dealers would market it.

But some customers who come in to look at the Continental but trip over the price barrier may well order a Lincoln as the next best thing.

Small Profit, Big Prestige

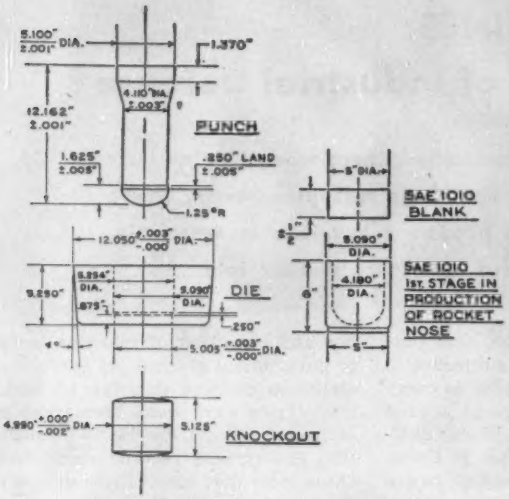
Since Ford in this instance would be dealing with customers who can afford $10,000 for a car, it might be expected that the company would try to realize a substantial profit on each unit. Quite the reverse is true. While the Division doesn't expect to operate at a loss, neither does it plan on whopping big profits.

In fact, it's believed the Continental will retail at a percentagewise margin of profit lower than that of any other production automobile. The value of prestige which will accrue to Ford is immeasurable, however.

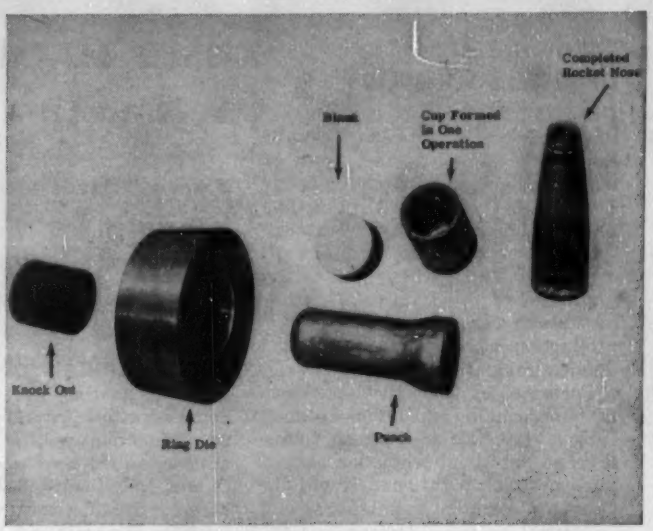
The first Continental wasn't intended for the market. It was specially built for the late Edsel Ford, but as soon as he was seen driving it, others wanted to own one, too. One story has it that Edsel Ford once drove his Continental to Florida on vacation, returned with 200 orders for it.

His youngest son, William Clay Ford, is now charged with producing and marketing a distinguished successor. The Special Products Division is serving as advanced management proving grounds for the 29-year-old executive.

Before mid-1955, he will transfer the Division's staff to headquarters at Ecorse, near Dearborn. Total cost of the new building, now under construction, will probably run to about $20 million. Tooling will not be a major cost factor—so much hand work will go into the car, high-volume tools won't be needed.



With this tooling...



Midwest firm gets these parts

Cold extruding rocket noses

DIE STEELS FOR COLD EXTRUSION—Rocket projectile noses are extruded from SAE 1010 steel by a large plant in the Midwest. First extrusion stage is most difficult in the sequence. Carpenter Steel Co reports on the punch and die steels being used and heat-treatment required. Most successful punch has been Star-Zenith, an 18-4-1 (T1) high-speed steel that was still in use after producing 14,000 pieces. Punch was hardened in a salt bath from 2350 F, then double drawn at 1050 F to R_c 62 to 64. It was then given a liquid-nitride treatment for 5 hr at 1000 F which develops a surface hardness of R_c 72 to 74 for a depth of about 0.001 in. Operating temperature of the punch is about 500 F, maintained between shifts by a special heating jacket. Die ring is made of Vega, a manganese-chrome-moly, nondeforming, air-hardening die steel, still in operation after 23,000 pieces. Ring was heat-treated to R_c 58 to 60.

REPLACEMENT: AMA Spends Two Days Talking It Over

In a searching and unprecedented industry-wide forum on replacement of capital equipment, American Management Association finds that management more and more needs to buy wisely and with an eye to the future in an era of tough competition and narrow profit margins

NEW YORK—Every phase of capital goods replacement—from taxation to machine-tool leasing—came in for searching analysis by more than 600 top executives from many industrial fields at American Management Associations' Special Conference on Capital Equipment Replacement here May 3-4.

Covered in intensive sessions were such phrases of replacement as operating and management factors, economic and financial factors, case histories of savings through well-planned replacement policies, leasing vs purchasing of capital goods, relationships of men and machines.

Speaking on one of today's most controversial metalworking topics, Frederick J Muth of Armstrong Cork Co said the "Number One advantage of leasing is the freeing of funds for working capital." He added that shortage of working capital keeps many companies from achieving their full growth because the rate of return on operating capital is much higher than that for money invested in operating equipment and facilities.

Speaking on the problems his company encounters in making capital controls work in the electronics industry, Leon C Guest, Jr, controller, Sylvania Electric Products, Inc, said the biggest headaches arise because the industry is turbulent, highly competitive, and must make rapid product changes.

As a result of this, Mr Guest said, conventional capital controls would take too much time, so Sylvania has installed a followup system, including a standard audit 6-12 months after a new operation starts, repetitive analyses of profit-and-loss statements, and operating summaries.

L E Grimes, asst comptroller, E I duPont de Nemours, said the question, "Did the machine pay off" is "particularly painful"—if the answer is yes, there is a temptation to let the machine speak for itself, but if the answer is no, there is "understandable reluctance" to admit the request was ill-conceived. But by following up performance, especially bad and especially good results can serve as a guide for future operational decisions.

INDUSTRIAL SECURITY CONFERENCE SCHEDULED

NEW YORK—Management's responsibility in plant protection against enemy attack will be the theme of the Sixth Annual Industrial Security Conference here May 26. More than 100 key industrial security, military and government officials from all over the country will attend at the invitation of the Industry Security Institute to discuss industrial defense, production mobilization and related defense regulations.

Forum highlights will include current and pending legislation covering internal security as it affects industry, and industrial protection against nuclear attack. Other panels will discuss new security regulations, and industrial mutual-aid programs.

Featured speakers at the Conference will be Julius N Kahn, counsel to the Senate Foreign Relations Committee, who will discuss new legislation governing industrial protection, and Harold L Goodwin, director of Atomic Test Operations, FCDA, who will speak on defense under atomic attack.

Details are available from Industrial Security Institute, 475 Fifth Ave, New York, NY.

NEW DEVELOPMENTS AT WELDING SHOW

BUFFALO—Exhibits of latest welding equipment and papers on newest technological developments on welding and brazing competed for the spotlight at the American Welding Society's Welding and Allied Industries Exposition held here May 5-8. Almost all leading manufacturers of gas and electric welding equipment were represented, and most exhibits featured actual welding operations.

Particularly noticeable: increased popularity of contact electrodes, first public demonstration of inert-gas spotwelding with a manual gun, heliwelding of color-TV tubes, and a new electrode that welds mild steel twice as fast as conventional electrodes.

Technical papers at the spring meeting, held in conjunction with the Show, covered such diverse subjects as welding and brazing of titanium, bridge construction, weld strength, power sources, submerged-melt welding, brazing molybdenum, welding 90/10 copper-nickel, adhesives, welding procedures and powder-metal electrodes.

USED MACHINES: Second Line of Industrial Defense?

If US industry is atom-bombed, there won't be time to wait for new machine tools to replace them. That's where used machines become a key item in America's industrial defense, used machinery dealers told

PHILADELPHIA—"If we find ourselves in another war, subjected to bombing attack, our ability to carry on production will depend almost entirely on the used machinery dealer and rebuilder," Ralph E Cross, Director of Metalworking Equipment Division, Business and Defense Services Administration, told members of the Machinery Dealers National Association at their annual convention here May 12-15.

No US-Tool Leasing?

Speaking on leasing of government tools to private industry, Mr Cross said, "Contrary to some reports, there have been virtually no leasings at all, and there is no intention on the part of the Defense Dept to start now."

Also on the subject of renegotiation, Mr Cross said, "At this moment the lawmakers are trying to remove the inequity that exists in the application of the partial, mandatory exemption to machine tools purchased for the account of the government."

Mr Cross reassured the used machinery dealers on another point of vital interest to them when he concluded by stating he thinks "it is highly probable" that the declining balance method of depreciation will soon be applicable to used tools.

This was confirmed by MDNA President Richard M Nathans in his presidential address. Mr Nathans, too, stated he has "good reason" to believe used machine tools will shortly be subject to the same accelerated rates of depreciation as new machine tools. Mr Nathans also suggested that MDNA evolve a plan to help the government in the liquidation of surplus machine tools.

Scheduled speaker, John H Williams, Chief, Production Equipment Branch, Office of the Assistant Secretary of Defense, Supply and Logistics, was replaced by his assistant, Howard Millbourne, who told how his department checks the number and condition of machine tools in government storage. At every installation checked thus far, he said, inventories have been "remarkably accurate," giving the lie to rumors that government records show machine tools that aren't there or don't show tools that are there.

Mr Millbourne said his department has started an inventory of half-a-million machine tools in US arsenals, Navy yards and defense plants. This inventory, he said, will cover all US tools not actually aboard ship or in use by troops in the field.

And the Supply and Logistics department is starting a program to test all government machine tools in storage to see if they are in running order and if they will still hold the tolerances they were designed for.

Speaking at MDNA's General Industry Meeting the afternoon of May 13, Thomas Johnston of Detroit evoked considerable discussion when he brought up the subject of tax deductions as they apply to a leasing contract with an option-to-purchase clause. It was proposed that MDNA study the possibility of preparing a standard lease form for members.

Also speaking at the General Industry Meeting, Joseph Miller of Miller Machinery & Supply Co, Toronto, urged strong cooperation between US and Canadian used machinery dealers. Today, he said, there are "very few good US machine tools available in Canada," because most of those made available to the Canadian war effort have been shipped back to the US since the end of Korea. And, he said foreign machine-tool builders are making good headway on the Canadian market because their prices are "definitely competitive" with those of US machine tools.

MDNA officers re-elected at the meeting were: president, Richard M Nathans; first vice president, Thomas J O'Brien; second vice president, Benjamin Weiss; and treasurer, Robert Rice.

Raymond B Kropp

Hugo Lorant

Paul Mayer

Names in the News . . .

Raymond B Kropp, executive vice president and treasurer of Kropp Forge Co, Chicago, has been elected chairman of the board, and chief executive officer. Associated with the firm since 1934, Mr Kropp will continue to serve as treasurer.

Hugo Lorant, vice president and member of the board of Hydropress, Inc, New York, has been elected senior vice president. **Paul Mayer** has been appointed assistant vice president.

R E Price has been named general manager of the Gardner Machine Co, Beloit, Wis. Prior to joining the organization in 1952, Mr Price was associated with Landis Tool for 23 years. **Russell L Dustman, Jr**, has been appointed manager of the machinery sales office in Richmond, Ind. He will supervise sales and service engineering for disk grinders in southern Indiana, western Ohio, and Kentucky. **John E Schobinger**, formerly manager of the Hartford sales office for Landis Tool, has been named manager of the Detroit sales office for the machinery division of Gardner.

William F Wilson has been appointed works manager of The Gear Grinding Machine Co, Detroit. He will be in charge of all manufacturing operations in the company's gear, joint, and machine tool divisions. Mr Wilson comes to Gear Grinding from the Walker-Turner Div of Kearney & Trecker Corp, where he was works manager for four and a half years.

Hugh T Price, Jr, has been named factory manager of Norton Co's Grinding Machine Div.; he replaces **Iver G Freeman** who has joined Reed-Prentice Corp as a vice president. **Roland T Nelson** succeeds Mr Price as production manager, and **Oscar A Erickson** has been named to Mr Nelson's former post as planning engineer.

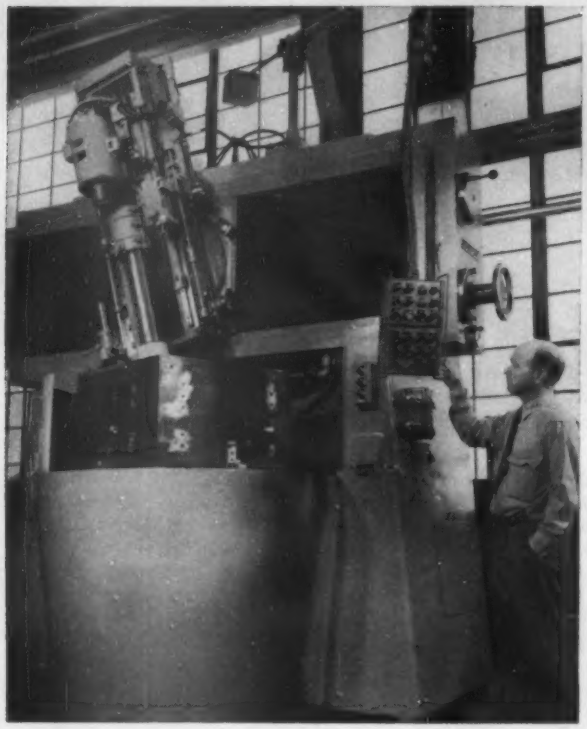
R E Price

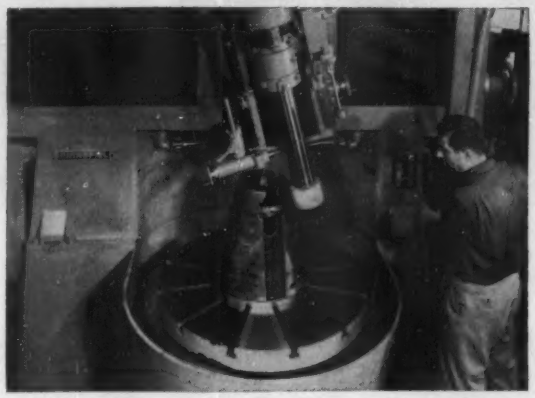
Hugh T Price, Jr

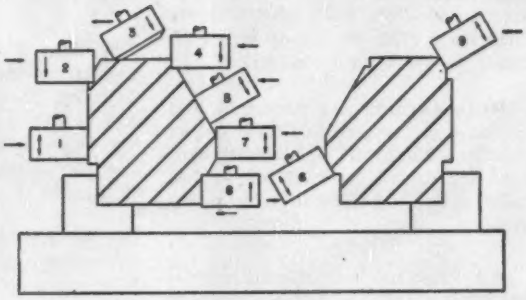
OBITUARIES

Harry L Bill, 72, vice president and general manager of the Greenfield Tap & Die Corp, Greenfield, Mass, died April 15 of a heart attack in Amersfoort, The Netherlands. Prior to joining the company in 1941 as vice president, Mr Bill had served as president of United Aircraft Products, Dayton, and as vice president of Bendix Aviation Corp's subsidiary, Pioneer Instrument Co. While at Greenfield he was instrumental in the acquisition of the Geometric Tool Co of New Haven, of which he was named president, and the Ampco Twist Drill Co of Jackson, Mich, later moved to Greenfield.

Lloyd D McDonald, 60, executive vice president of Warner & Swasey Co, Cleveland, and one of the nation's outstanding authorities on taxes and depreciation of capital goods, died at his home May 15 of a heart attack. Mr McDonald joined Warner & Swasey in 1918 as a member of the company's credit department. Successively, he became manager of that department, assistant treasurer, vice president, and in 1950 executive vice president. He had been a member of the board of directors since 1936. Mr McDonald was also vice president and a director of Sterling Foundry Co, and a director of the Osborn Mfg Co and Rotor Tool Co. For many years active in the National Machine Tool Builders' Association, Mr McDonald served as its president in 1948-49, and last year was chairman of the Association's Sub-Committee on Tax Policy. In that capacity, Mr McDonald presented the machine tool industry's case for optional depreciation of capital goods before a Congressional committee.







Does Nine Operations In One Chucking

Rated as a 42-in. vertical universal grinder, this hydraulically actuated machine has a normal maximum swing of 52 in. Designated model 3TR, it is already in use at two installations, in one case grinding ring and plug gages for checking parts of guns and gun-mounts, in the other for finishing jet-engine parts.

The versatility of the Springfield machine is shown above by cross-sectional sketch. It is not only capable of finishing these surfaces, but reportedly achieves perfect matching of mating parts. Only one angle setting of the head, up to 45°, is necessary for male and female parts.

The machine is hydraulically actuated to provide infinitely variable speeds of the work spindle. All valves, except flow control, are electrically controlled. The work spindle speed, either 88 or 176 rpm, is governed by a flow control valve. Push-buttons on the pendant station (where all operating controls are centered—see photo on left) control rapid traverse and approach, up and down, of the grinding head. Selector switches control cross feed in either direction, impulse feed, face feed, and down feed. Cross feed is controlled at top, bottom, or both ends of stroke, with amount of feed governed by a dial on the feedbox.

A Sheffield setup is used for accurate size control of bores, both straight and taper. Cross feed is shut off when hole has reached spark-out size. The head continues to oscillate until hole reaches final size, then automatically retracts. Spark-out and final size are individually adjustable to handle holes from 2 to 40 in. in diameter, and from 1 to 18 in. above the face plate.

The following descriptions refer to the cross-section which shows wheel working on a hypothetical cylindrical workpiece:

1. OD grinding. Wheel oscillates up and down between stops, with feed available from either or both ends of stroke and automatic stop on the crossfeed.

2. Shoulder and plunge grinding the OD. Shoulder grinding is done by using positive stop or accessory servo downfeed. The latter is primarily used when a number of shoulders have to be ground. Plunge grinding the OD is accomplished with normal feeds used for OD and ID grinding. However, since the head does not oscillate during plunge grinding, an arrangement is provided to impulse the feed exactly as at either end of the oscillating stroke. This impulse feed frequency is controlled by an electronic timer. The automatic stop on the cross feed also functions on impulse feeding.

3. Wide face grinding. Width of face is greater than wheel diameter. Head is set at an angle of at least

Materials and Parts . . .

5° and moved down against the positive stop. The wheel is fed into the work by means of this stop and is traversed back and forth across the face by the face feed control. Rate of traverse is controlled by hydraulic flow control valve.

4. ID shoulder and plunge grinding.

5. Internal angle grinding. Head is set to desired angle and oscillated between stops, fed at either or both ends of stroke.

6. Angle grinding. Another version, similarly controlled.

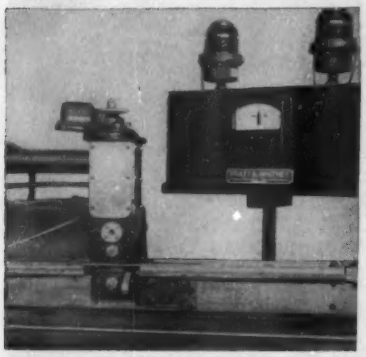
7. Internal grinding. Feed is stopped by automatic stop.

8. Plunge grinding shoulder and ID. Head is fed up for the first.

9. External angle grinding.

Additional grinding heads and accessory side heads are available, the latter making it possible to surface grind simultaneously with other operations. Also, crossrail can be made adjustable from 12 to 48 in. above face plate. Other accessories: servo downfeed; dial angle-setting attachment; automatic sizing control.

Springfield Machine Tool Co, Springfield, Ohio



Electrolimit Continuous Gage for Centerless Grinders

Developed originally for cold-rolling mills, Model D electro-limit continuous gage can be applied to centerless grinders for continuous gaging of precision-ground bar stock. Application to through-bar grinding provides continuous control of accuracy. With additional control circuits to gage, off-tolernace signal can be provided to shut down machine, signal operator, or provide feed-back impulses.

The Model D is a direct-setting measuring gage employing counter for setting directly to 0.0001 in. and a meter for reading plus or minus deviations from setting to 0.0001 in. It is adaptable to any ½-in. range such as 0.2500 to 0.7500 or 0.500 to 1.0000 in.

Pratt & Whitney, Div Niles-Bement-Pond Co, West Hartford 1, Conn

New Grade of 300 Series Carboloy Cemented Carbide

Grade 350, a medium-duty high wear-resistant steel cutting grade cemented carbide for light roughing and general finishing has been announced by Carboloy Dept of GE. Said to provide up to 30% better performance than existing carbides in this machining area, grade 350 is the second to be developed in the 300 Series which produced heavy-duty grade 370 several months ago. The material with its unique grain structure extends the machining range of the new series to withstand cutting temperatures as high as 1800 F.

One of the companies testing the grade 350 on an axle shaft reported that the number of units machined per grind jumped more than a third. Another company machining a torque strut for landing gear found it increased tool life by a ratio of 6 to 1. The Carboloy Dept. further reports that on some of the tougher machining jobs like machining shell forgings (modified 1045 steel) where work comes from steel supplier in scaly and out of round condition with varying steel analysis due to different steel heats, grade 350 outperformed other grades of carbides by 20 to 30%.

Blanks of grade 350 carbide are available in numerous sizes and three styles of rectangular blanks. All standard square, triangular, and round mechanically held inserts, finish ground for use, are available in this grade. Grade 370 carbide insert blanks are stocked in similar range of selected blank designs and sizes. A wide selection of both right- and left-hand standard tools is available in both grades.

Carboloy Dept of General Electric Co, Detroit 32, Mich

. . . including

Air-feed lathe has carriage which is pneumatically-hydraulically powered in automatic cycle . . . . . page 174

Milling machine handles workpieces to 5000 lb, has all operations controlled from master pushbutton panel . . . . page 175

Compacting press permits quick adjustment for changes in part density or weight while press is in operation . . . . . page 176

Progressive die presses, multi-crank, have cranks evenly synchronized, allow adding double-crank units . . . . . page 180

Portable plating barrel for small quantities is fabricated from acrylic . . . . . page 182

Jig borer has maximum accumulative error of 0.0006 in. on longitudinal and cross travel page 184

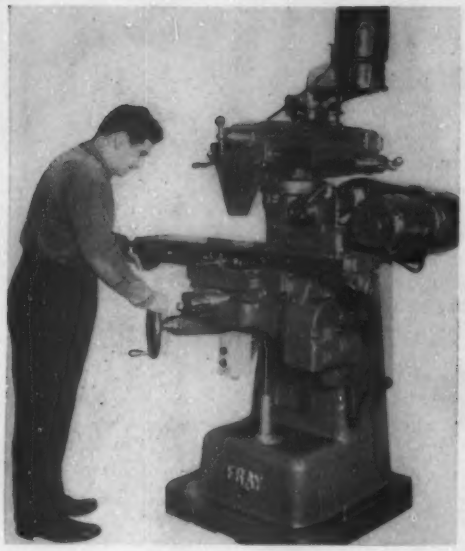
Stretcher leveler, automatic, produces continuous 50-ton stretch, handles 45-ft workpiece . . . . . page 186

Inclinable presses, open-back, incorporate air-actuated clutch which is electrically controlled page 190

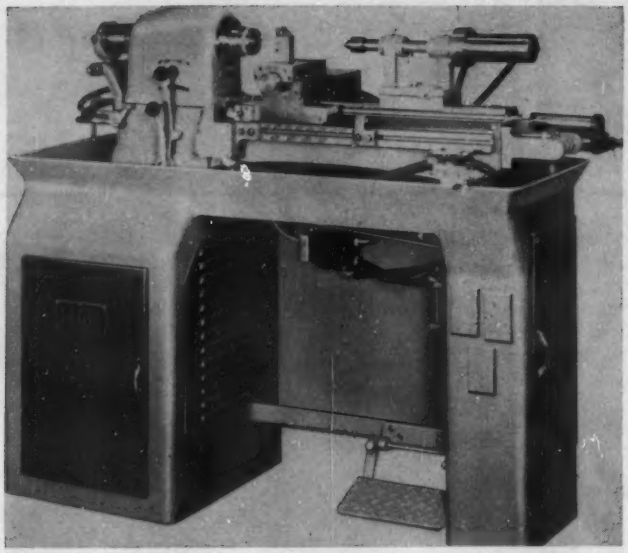
. . . and in June 7

Double-end screw machine works front and back of pieces in one complete cycle.

Impact press, all-pneumatic, features uniformity of impact force on work varying in thickness.



POWER FEED UNITS are accessories to line of high-precision milling machines. Two types are: table unit for model 10, power downfeed for Type 4. Table feed is arranged for pickoff gears from ½ to 13 in., and includes 1/3-hp motor. Head power feed has three feeds: 0.0015, 0.003, and 0.006 ipr — *The Fray Machine Tool Co, 2935 N Ontario St, Burbank, Calif*



AIR-FEED LATHE, high-production, is reported to have high precision and simple operation. Carriage is pneumatically-hydraulically powered in automatic cycle. Headstock spindle, capable of 4000 rpm, has pre-loaded ball bearings. Either draw-in collet of 1-in. capacity or stationary collet of 13/16 can be supplied. ¾-⅝-hp motor supplies power through clutch-brake drive wired into carriage cycle. Swing is 11 in., carriage travel, 13 in. — *Elgin Tool Works, Inc, 1771 Berteau Ave, Dept E, Chicago 13, Ill*

Floating Holder Features Improved Collet Action

Lock-and-eject-type floating holder for use on mutliple-spindle reaming and tapping machines is said to provide a more powerful, truer collet action on shank of cutting tool. Holder combines advantages of unrestricted float with easier, faster insertion and ejection of tools.

Threaded nut on nose of holder revolves freely on ball bearings, drawing threaded chuck into taper seat and compressing it evenly on shank of tool. Four-split tap chucks are said to provide more powerful and accurate collet action. Reamer chucks are split on two sides.

Drifting is not necessary to remove tap or reamer. Operator twists threaded nut in reverse direction, ejecting tool from chuck. Since drift holes are eliminated from body of holder, more efficient sealing against chips and dirt is provided.

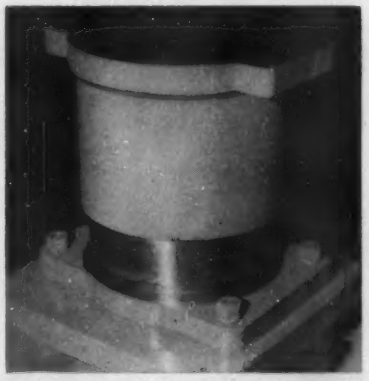
Lock-and-eject type floating holders of special design are available with tension and compression features to compensate for spindle feed and tap pitch variations and reduce tap breakage. Three standard sizes with range of adjustable adapter shanks are now in production.

Scully-Jones and Company, 1901 South Rockwell St, Chicago 8, Ill

Handy Angle Saw Run By Portable Drill

Standard ¼-in. electrical drills geared to any speed from 1800 to 3500 rpm will mount a 1½-lb metal saw with either bayonet or tapered blades. Unit is under 7 in. long, including blade; mounts blade at right angles to drill spindle, and is reversible for right- or left-hand users. Saw will cut its own starting hole.

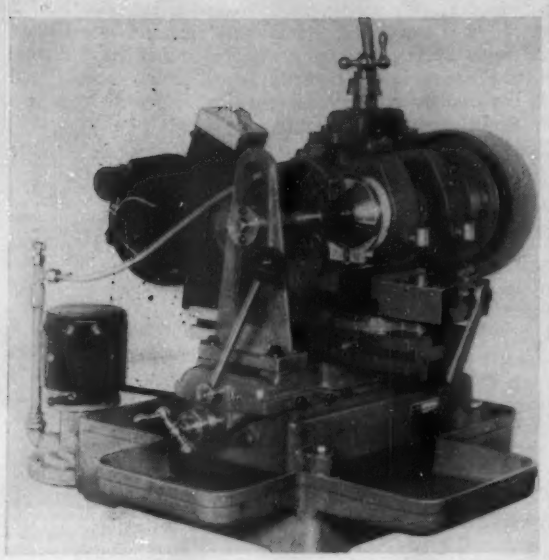
Price & Rutzebeck Co, Box 30, Hayward, Calif



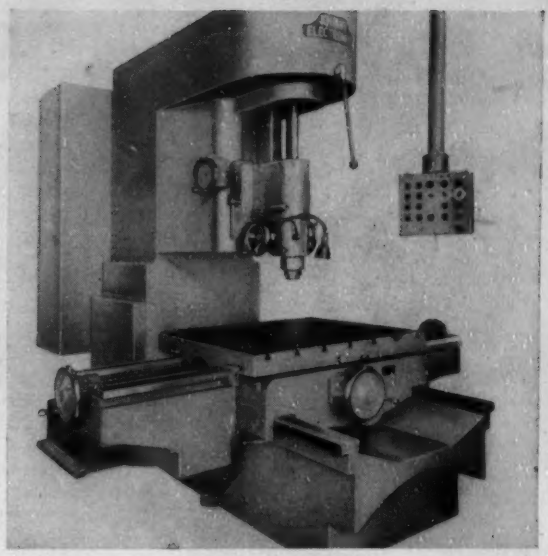
Dayton Rogers Cushion Develops 45-ton Pressure

High ring-holding pressures on a 100-psi airline in a limited size press bed opening are obtained with Model H Universal pneumatic die cushion. Cylinder dimensions are from 10 in. to 24 in. Pressure pad is custom made to fit details of press bed opening and construction is provided with internal guiding to compensate for off-center loading. Adjustable stopping method will arrest pin-pressure pad at any desired position on up-cycle. Capacities of the single cylinder design range from ½ ton to 45 tons.

Dayton Rogers Mfg Co, Minneapolis 7, Minn



BENCH-TYPE MILL accessories make the Barker unit more versatile and capable of increased range of milling and machining operations. Shown above is mill which includes low-spindle-speed drive, arbor support for heavy cuts, coolant pan with motor-driven pump, cutter guard, and spindle-nose coolant shield. The model is equipped with micrometer feed screws on head and saddle travel positions. It is possible to have hand-lever or micrometer-feed-screw operation to control travel on all three positions — *The Barker Engineering Co, 500 Green Road, Cleveland 21, Ohio*



ELECTROMILL will bore, drill, or vertical-mill pieces as large as 30x48 in. and weighing up to 5000 lb. All controls are located on single panel that can be moved to most convenient position. Setup, operation, and inspection are simplified. Spindle speed and feed can be changed without stopping spindle. Non-gear direct drives are incorporated. Variable-speed motors, equipped with Thymatrol, offer complete range of infinitely variable speeds and feeds. Design of column and spindle head gives 35-in. throat capacity — *W B Knight Machinery Co, 3920 West Pine Blvd, St Louis, Mo*

Indexing Unit Is Cam-Operated

Standard Tool & Manufacturing has developed a cam-operated indexing unit to provide precision positioning between automatic production stations or to provide simplified means of timing production operation drives. Standard states that the automatic indexing unit can reduce machine design time by as much as 50%.

Increments of either 8, 12, 16, or 20 can be obtained during a complete cycle. Accurate positioning for such operations as milling, drilling, soldering, crimping, or assembly is provided at each index position.

Worm-and-gear connections to the input shaft drive the cylindrical cam which in turn provides motion to the indexing table. All rotating shafts are mounted on tapered roller bearings to insure accuracy. Cam-shaft extensions provide means for operation of auxiliary drives or other production devices.

Dimensions are 17 in. long by 16½ in. wide by 13¾ in. high.

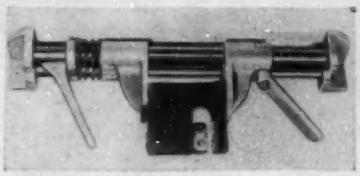
Standard Tool & Manufacturing Co, 740 Schuyler Ave, Lyndhurst, NJ

20-Ton Press Subs for Screw Presses

Walsh model 20X is a die-tryout, shearing-in, and production press with die-forged crankshafts and ball screws, bronze bearings, and ground or hand-scraped moving parts.

Unit is inclinable and locks in any position; can be furnished with varidrive, automatic lubrication, two-button safety device, and non-repeat attachment for safety.

Walsh Press & Die Co, Div American Gage & Machine Co, 4709 W Kenzie St, Chicago 44, Ill

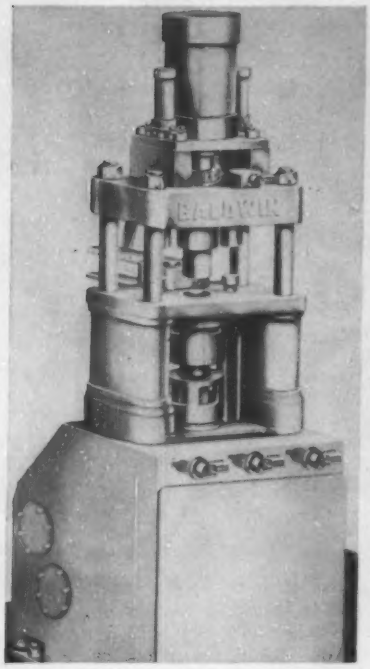


Quick-Action Vise

AVA quick-action vise locks part in two seconds. Vise also serves as a clamp and is reported to open wider than other vises and hold tightly with little effort. Portable or attachable vise may be used in any position. The 6- and 12-in. vise costs $8.95, the 30-in. size $11.95. Vises are available sized in multiples of 6 in. at $1 additional per 6 in. up to a maximum of 60 in.

Type 108 aluminum castings with ¾-in. cold-rolled tubing is used to make vise strong and lightweight. Two lever springs give slight squeeze to 300-lb. pressure when jaws are flipped closed. One jaw with lever lock bolts to tube; other acts on patented double-spring action to assure lock. Tubes and springs are gun blued for rust resistance.

Evanson Equipment Co, 33 Warren St, Newark 2, N J



Compacting Press Provides Adjustment for Density, Weight

Baldwin-Defiance Model L, 50-ton compacting press is reported to offer high quality production of powdered metal parts at low cost. It is specifically designed for trouble-free operation; moving mechanism is fully enclosed, pressure lubricated, and sealed against dust.

Press is mechanical, four-column crank-type equipped with flywheel, pneumatic clufch and brake, and driven by 10 hp totally-enclosed motor through variable-speed drive. Special feature permits quick adjustment for changes in compacted-part density or weight while press is in operation. Visual indicators for top punch position, core float down-stop position, depth of fill, and ejection stroke read directly to 0.001 in.

Hydraulic head assures accurate control of pressure being applied, preventing overloading and prolonging life of tools and press. Floating die holder and core rod float independently of each other against pneumatic cushions. Positive adjustable stops control distance of movement. Auxiliary stationary core rod can be mounted in addition to floating core rod.

The depth of fill and stroke of the bottom punch are adjusted by two separate controls. The relative position of core rod to die is also adjustable. To control flange thickness, obtain uniform density and eliminate weld line when section changes, prepressing die position control is provided. Shuttle type feeder, air operated and cam controlled is supported on guide rods with spring loaded cutoff ring to assure that same volume of material is covered over die cavity each time. Shuttle completely covers die before lower punch moves down to fill position.

All moving lubricated parts are completely enclosed and sealed to prevent abrasive material from entering. Gear-type pump driven by an electric motor forces filtered oil through drilled crankshaft to crank and connecting rod bearings. All bearings subject to load are pressure lubricated. A pressure switch insures that the press cannot be operated unless there is oil pressure in the system.

The press can be cycled as follows: continuous run; semi-continuous run with dwell stop at any predetermined point, dwell, start automatically—dwell time is adjustable; single stroke, stop at any predetermined point, restart when operator pushes start button; single stroke with dwell, combination of steps 2 and 3; inching.

Specifications include: rated pressure, 50 tons; die float adjustment, 0 to 2 in.; core rod float down adjustment, 0 to 3 in.; stationary core rod capacity, 5 tons; ejection capacity, 25 tons; ejection stroke adjustment, 0 to 4 in.; size of die opening with dual ejection, 5 in., without dual ejection, 7 in. dia. Speed is 8 to 32 strokes per min; electrical equipment conforms to JIC standards. Recommended pit depth is 3 ft. Size of machine is 11¾x5½x7 ft.

Baldwin-Lima-Hamilton Corp, Philadelphia, Pa

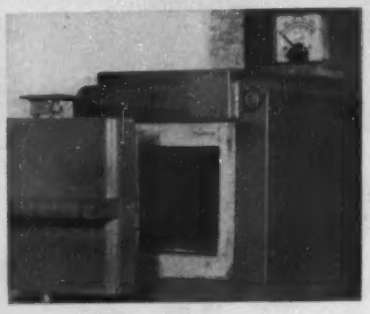
Milling Machine Vise Has Swivel Base

Palmgren No. 60B flanged milling machine vise with swivel base is precision built and constructed for heavy-duty service.

It is provided with flanges for clamping to machine table and may be used with or without 360° graduated swivel base. Base is equipped with two bolt lugs for clamping to machine and also furnished with two 11/16-in. keys and screws to fit machine table slots.

Vise has 6-in. width jaws which open to 6 in. and a jaw depth of 2 in. Removable ground steel jaw plates are provided and heavy Acme-thread adjusting screw is equipped with screw bushing which is replaceable.

Chicago Tool & Engineering Co, 8383 South Chicago Ave, Chicago 17, Ill.



High-Temperature Electric Furnaces

Line of Thermocal high-temperature electric furnaces ranges in six standard sizes from 6x6x9 in. to 24x24x29 in. Features stated include controlled, uniform heating processes at low initial operating and maintenance cost, simplicity of design, durability, and efficiency of operation.

Furnaces can be supplied to operate at 2300 F intermittent and 2200 F continuous temperatures. They are recommended for tool and die heat-treating, copper brazing of carbide tools, production heating of small parts, hardening of HSS, annealing, drawing, tempering, and stress relieving.

Pull-away heat-shield-type door prevents hand burns and maintains tight seal. High quality insulation provides maximum thermal efficiency, low outside wall temperature, and reportedly reduces operating costs. Kanthal heater elements are imbedded in refractory plates. Heater plates are easily removed from front. An air scoop captures hot gases and fumes emanating from furnace chamber.

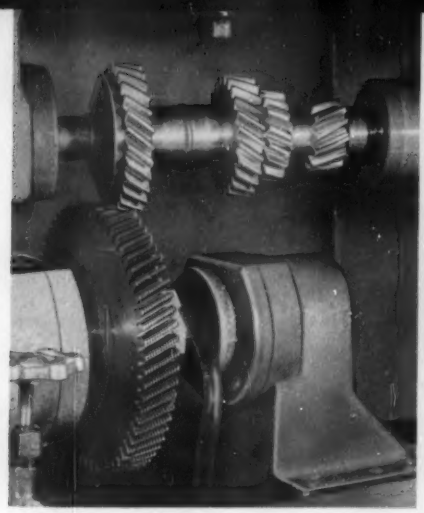
The Caljorn Co, 1168 Watson Ave, Whittier, Calif

Small Condensate Pump

Miniature condensate pump measures 5x8x5 in. It is hermetically sealed in oil and has Underwriter's approved glass-insulated terminals. Pump case is of die-cast aluminum with baked-on plastic coating.

Pump develops 4 psi and has shut-off head of 9½ ft. It will discharge 180 gph at 1-ft head, up to 28 gph at 8-ft head.

Samuel S Gelber Co, 162 N Clinton St, Chicago 6, Ill



This Month's

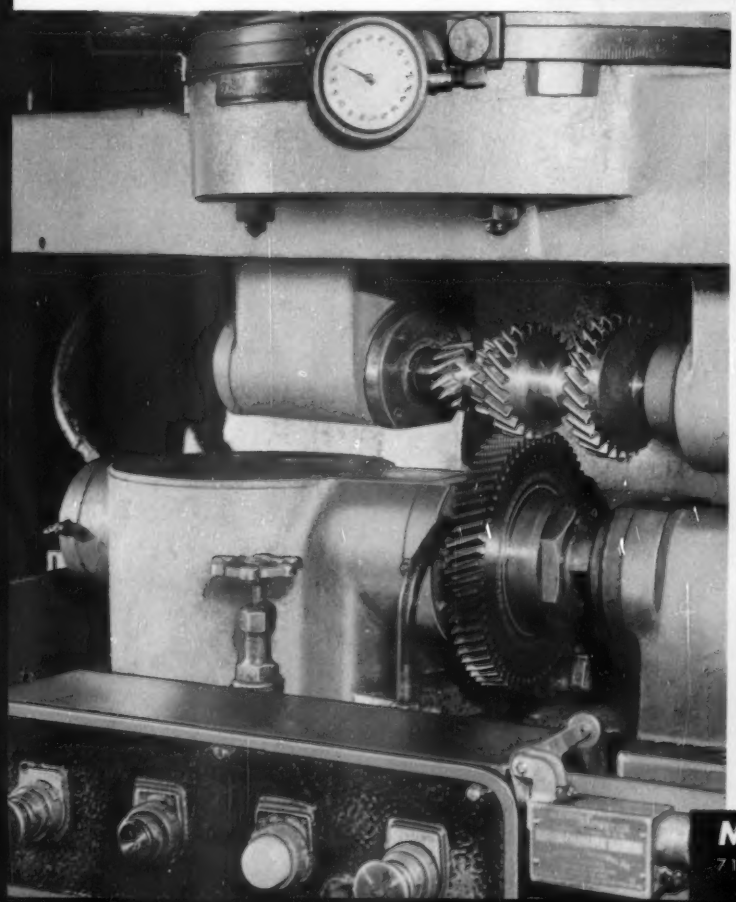
GEAR PIX

SHAVING—A large battery of Michigan model 870 rotary gear finishers (each operator handles two or three machines) shaves the gear teeth on this standard transmission cluster in a Detroit automotive plant. Pneumatically actuated adaptors speed the loading operations.

(*above*)—Shaving cycle time on this 27-tooth driver on the Michigan 870, using the modified underpass method, is 30 seconds.

(*lower left*)—This 23-tooth 3.253″ diameter .765″ face width intermediate gear on the cluster is finished in 24 seconds cycle time on Michigan 870 gear shavers by the modified underpass method.

(*lower right*)—Reverse gear on the cluster, 13-teeth, 8.25 pitch, .948″ face width, is shaved by the underpass method on Michigan 870 gear finishers in 29 seconds.



MICHIGAN TOOL COMPANY

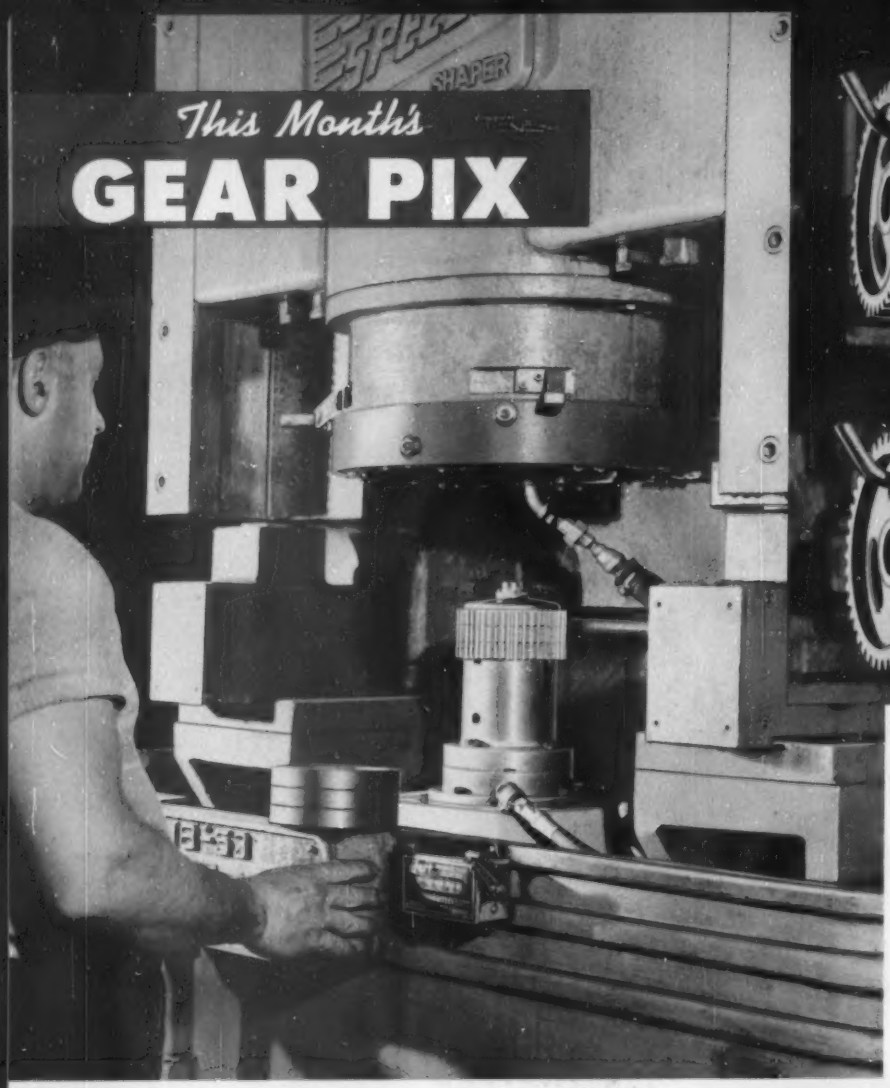
7171 E. McNICHOLS RD. • DETROIT 12, MICH.

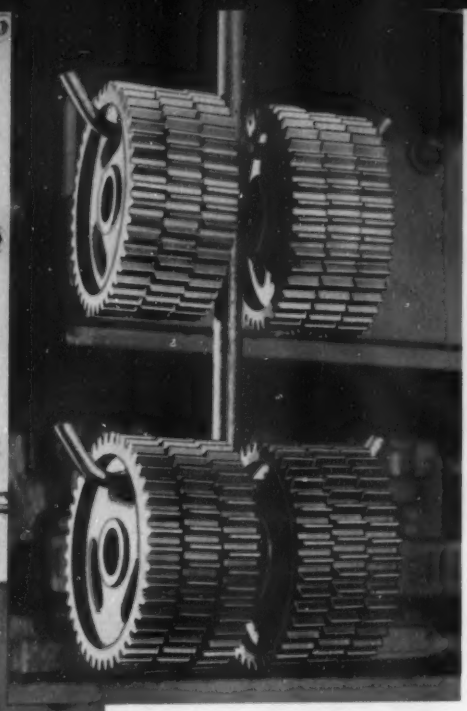
IN CANADA: COLONIAL TOOL CO. LTD

over

This Month's

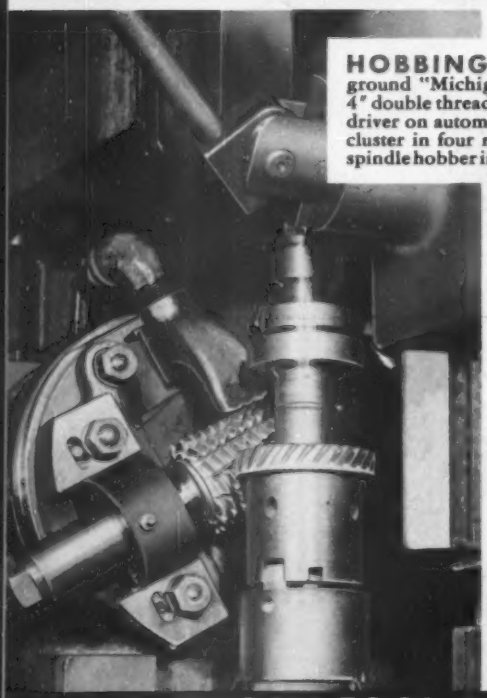
GEAR PIX



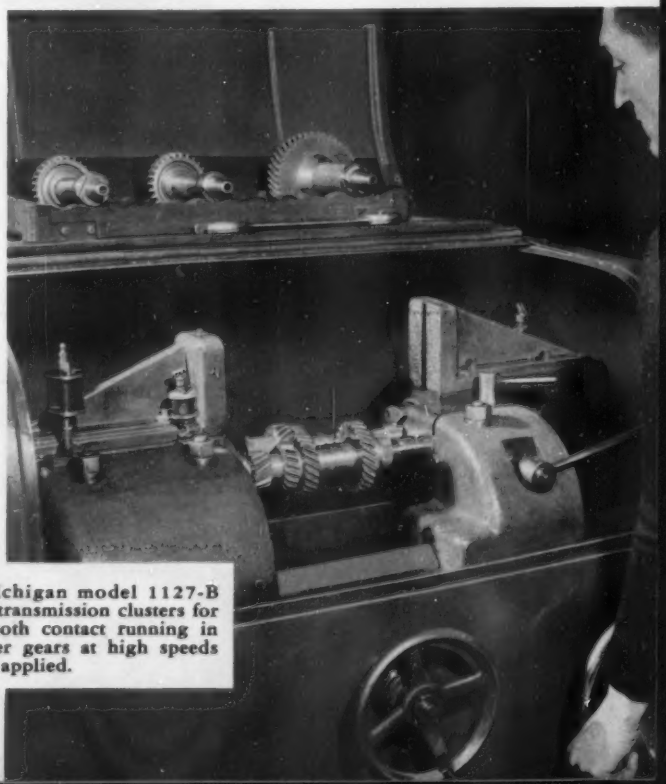


SPROCKETS—Two operators attending four Shear-Speed gear shapers, model 1853, cut teeth on 12 42-tooth cast iron camshaft timing gear sprockets (5.018″ diameter—.76″ face) in 53 seconds in one of the large Detroit automotive plants. Three sprockets are loaded on each arbor; hence, all the teeth on each sprocket are cut every 18 seconds—one tooth every .43 second actual cutting time on each of the respective machines.

On the four Shear-Speed gear shapers this results in one sprocket every 4.4 seconds; one tooth every 1/10 second.



HOBBING—Accurate unground "Michigan Process" 3″ x 4″ double thread hobs cut 27-tooth driver on automotive transmission cluster in four minute cycle on 8-spindle hobber in automotive plant.



SPEEDER—Michigan model 1127-B tests automotive transmission clusters for quietness and tooth contact running in mesh with master gears at high speeds with brake loads applied.

MICHIGAN TOOL COMPANY

7171 E. McNICHOLS RD. • DETROIT 12, MICH.

IN CANADA: COLONIAL TOOL CO., LTD

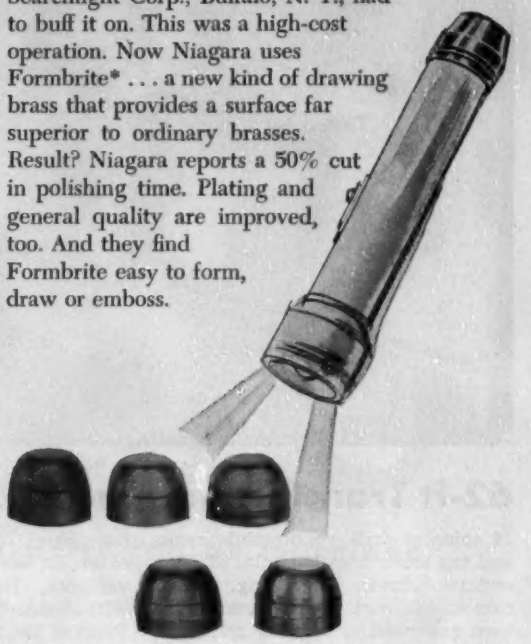
Over

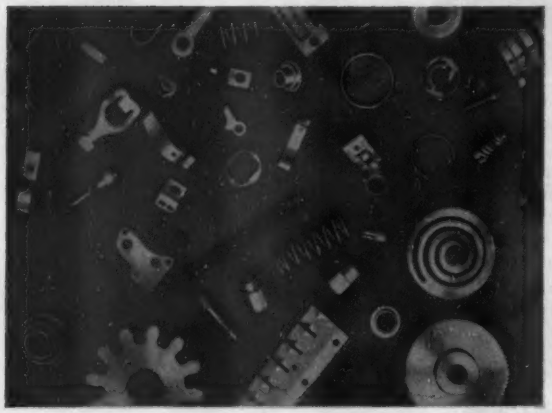
ANACONDA METALS AT WORK

The American Brass Company develops a new kind of brass that cuts polishing time 50% for one manufacturer and improves product appearance for another... makes bronzes that extend the life of many metal parts

Spotlight on high luster at low cost

The high luster on these brass flashlight end caps didn't come naturally. Niagara Searchlight Corp., Buffalo, N. Y., had to buff it on. This was a high-cost operation. Now Niagara uses Formbrite* . . . a new kind of drawing brass that provides a surface far superior to ordinary brasses. Result? Niagara reports a 50% cut in polishing time. Plating and general quality are improved, too. And they find Formbrite easy to form, draw or emboss.





Old age insurance...

It's easy to take out. And you pay no premium. All you do is specify ANACONDA Phosphor Bronze for the many components like those shown. Ten alloys are available in seven forms. All are strong and tough. They bear up under constant wear and flexings, periodic stresses, fatigue and corrosion. They resist abrasion . . . conduct heat and electricity well . . . keep their high elasticity. We'll be glad to help you select the Phosphor Bronze Alloy that's just right for your job.

What's in a nameplate?

According to the Arlen Trophy Co., Brooklyn, N. Y., one of the largest trophy and premium manufacturers in the country, the *appearance* of a nameplate often means the difference between landing or losing a sale. But price is important, too. That's why Arlen now makes their nameplates out of Formbrite. It costs no more than ordinary brasses. Yet, because of its superfine grain structure, it polishes to a bright finish in half the time. Formbrite results in harder, stronger, springier, more scratch-resistant products, too.

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Want more information?

Our Technical Department can give you a wealth of information on the properties and applications of Formbrite and Phosphor Bronze. Write to: *The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.*

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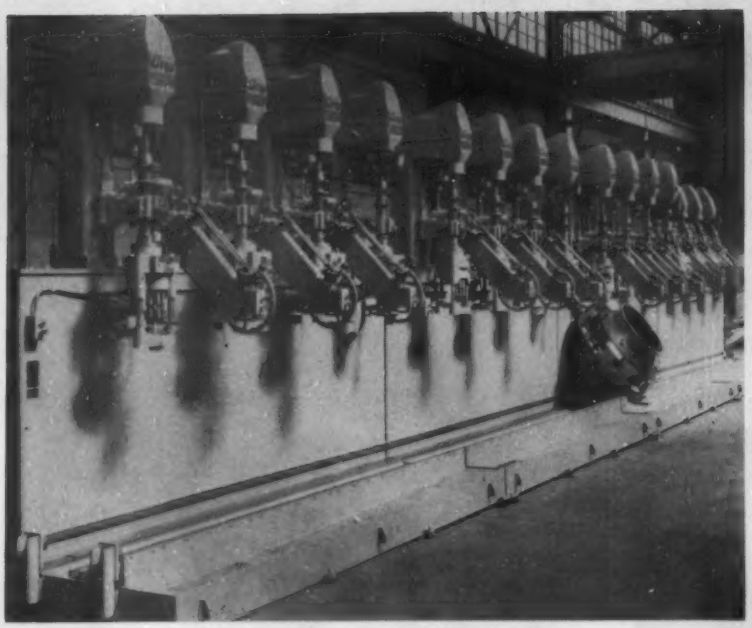

62-ft Transfer Machine

16 spindles drill, countersink, ream and tap more than 150 holes of a jet engine diffuser. A sliding fixture carries the part to each station in turn and permits rotation and positive indexing at each. Individual heads may be moved if required, or set at any desired angle (Final four are currently set at right angles to part axis). Controls are placed on extended arms for operator's convenience. Base is fabricated steel with standard drill columns above it. Tapping heads in the unit have lead-screw feeds. Units are started by a lever, are thereafter automatic.

Avey Drilling Machine Co, Cincinnati 1, Ohio

Four-Function Tool Etches and Demagnetizes

Easco etcher and demagnetizer has four functions: hand-etching tools, dies and parts, demagnetizing parts and fixtures, magnetizing small and medium sized parts, and resistance soldering. Unit is 10x8x8 in. and weighs 25 lb. Etching and soldering tools and tips are included. Price $95.00 fob.

Electro Arc Sales Co, 5270 Geddes Road, Ann Arbor, Mich

Dry Abrasive Cutting Machine Available in Two Types

Campbell Model 28 Sever-All is available as stationary and portable machine, is only 62 in. high and has cutting capacities as follows: solid steel to 4x4 in., angles and channels to 8 in., tubes and pipes to 4 in. OD. Other features include: hand-operated self-centering workholders which can be furnished with foot-operated treadle; time of cut 3 sec per sq in.; operator safety provided by totally enclosed cutting wheel during cutting operation; and furnished with 7½ or 10-hp motor.

Campbell Machine Div, American Chain & Cable Co, Inc, Bridgeport, Conn

Secret Ink Marks Any Surface

Magic Marker writes with felt nib making lines of various widths and of six colors. Ink is quick drying and claimed impervious to heat and cold. Cost is 69c, refills 25c.

Speedry Products, Inc, 91-31 121st St, Richmond Hill 18, NY

Textile-Reinforced Wheels Have Recessed Centers

Nu-Tex depressed-center and straight disk wheels are designed for cutting, slotting, weld removal, and rough grinding on portable or bench grinders. Built-in resiliency provides a cushioning action to reduce bouncing, distribute pressure evenly and hold close contact with work. Tough resinoid bond reduces breakage and increases wheel life.

Depressed center disks are available in 7- and 9-in. dia, with thicknesses from ⅛ to ⅜ in., and sizes for straight disks range from ½ in. up to 10 in. dia, and 1/16 to ½ in. thick. Grades range from 0 (hard) to 6 (soft), and grit sizes are in the most popular meshes.

Atlantic Abrasive Corp, South Braintree 85, Mass

Air-Operated Clamps

Series of air-operated clamps has toggle action with ability to "go around corner" to do its clamping. Series was designed to meet situations where space in horizontal plane is too limited to accommodate conventional air clamp. Model can be mounted in vertical position alongside work, but at lower level, and allows double-toggle action arm to swing in 45° arc over work to make spindle contact. Clamps are identified as AODT Series.

Lapeer Mfg. Co, Lapeer, Mich

Dings Magnetic Separator Saves Coolant

Permanent magnets pick up chips from coolant in separator that can be used with almost all types of metalworking machinery. System extends tool and wheel life, cuts part rejections, eliminates downtime for cleaning coolant, saves coolant and increases savings. Tips are easily removed from unit.

Dings Magnetic Separator Co, 4740 W Electric Ave, Milwaukee 46, Wis

YOU SAVE WHEN YOU USE OILITE FINISHED MACHINE PARTS

Sure... these intricate parts can be machined out of solid metal. *That's the expensive way.*

But... these **FINISHED MACHINE PARTS** are being made by **OILITE** *at a Fraction of the Cost.*

Oilite Finished Machine Parts serve the same purpose as conventional "machined" parts. Their performance is just as good, often better, because they can be self-lubricating and made to closer precision tolerances.

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Call an Oilite Engineer. Let him develop your ideas. He will suggest ways and means for decreasing your part costs and show you how to attain other important goals.

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Oilite Products of Metal Powders Include:
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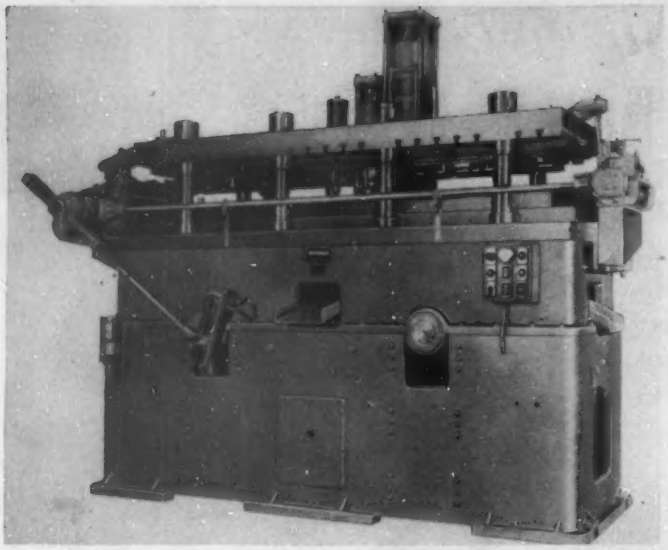
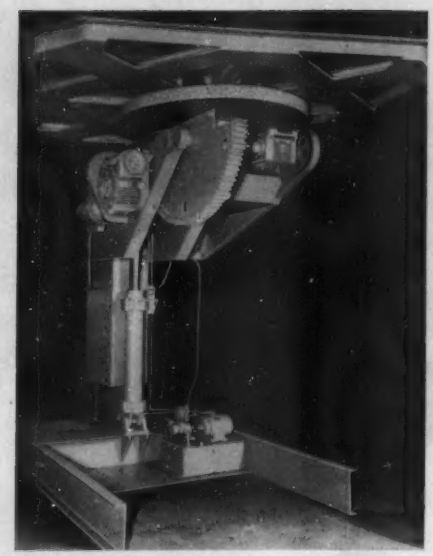
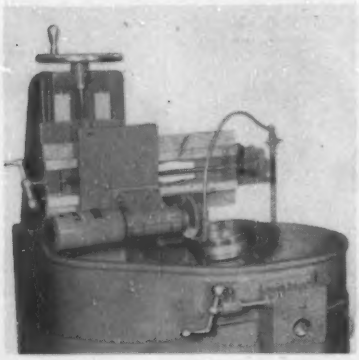


PROGRESSIVE DIE PRESSES, multi-crank, have cranks evenly synchronized; presses are designed to add any number of the double-crank combinations. Brandes patented features are said to insure an even pressure on all stations; top platen is always parallel with bed. Unit is engineered in sizes from 100 to 4000 tons. Pictured is the 300-ton press for progressive dies to 12½ ft in length—*The Brandes Press Co, Brandes Bldg, 6408 Euclid Ave, Cleveland 3, Ohio*



WELDING POSITIONERS use double-enveloping worm-gear speed reducers; any load placed on positioner table is absorbed as torque at output shaft of speed reducers. Table may be rotated 360°, tilted 135°, and hydraulically lifted up to 4 ft—*Pandjiris Weldment Co, St Louis, Mo*



Slitter Knife Grinder Has High Precision

To keep pace with better alloy steels being offered by slitter knife manufacturers, Hanchett has developed a new grinder for top and bottom slitter knives and all types of circular knives. Grinder permits grinding slitter knives to highest precision tolerances, both for concentricity and micro-inch finish, according to Hanchett. It operates on work grinding principle using coolants directly applied at point of wheel contact.

Grinding wheel assembly support has rigid column type of mounting for vertical adjustment to all knife thicknesses. Cross-slide movement and screw adjustments are reportedly positive and accurate. Automatic oscillation of grinding wheel is incorporated to insure high accuracy.

Slitter knives are held in horizontal plane supported by backing plate. Fixture revolves mechanically, and is said to develop no chatter marks. Fixture mechanism is enclosed for full protection. Large graduated dial adjustment is positioned for any bevel from 0 to 90°. Stainless steel diamond wheel dressed holder mounted below work fixture is adjustable so wheel dressing and truing can be done when necessary.

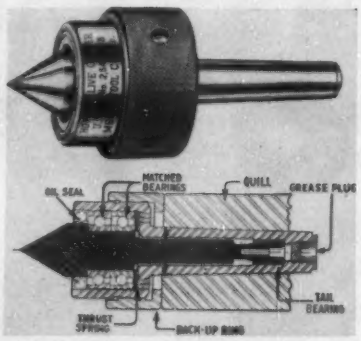
Gusher type motor-driven coolant pump with screen provides ample supply of coolant to permit clean cutting action. Coolant tank is enclosed in machine base.

Cast iron bases are normalized in Hanchett's normalizing ovens, subjected to 1280° heat-treatment. Grinder is guaranteed to grind top and bottom slitter knives to 0.0005 for concentricity, with surface finishes approximately 25 micro-inches.

Hanchett Mfg Co, Big Rapids, Mich

Model PCH-100 pull clamp with a hook, originally designed for the aircraft industry, can be used to pull in regular hook-fashion (inserted into a ring of a strap) or simply hooked over an angle iron. In the former, recommended pulling force is 100 lb; in the latter, pull of 200 lb can be utilized.

Lapeer Mfg Co, Detroit 2, Mich



Live Center Features Back-Up Ring

Howard live center features back up ring to assure positive rigidity. Ring backs up against face of quill, transferring rigidity of quill to head of center. Ring reduces spring in body of center at ratio of four to one.

Additional strength reduces danger of live center following work and helps eliminate run-out. Manufacturer states that for all practical purposes this live center has the rigidity of a dead center.

Matched ball bearings mounted in tandem in head and oil-impregnated bronze bearing in tail of shank permit greater thrust and radial loads at higher speed. All models and sizes of this live center have full length solid spindles.

The Melin Tool Co, 3375 W 140th St, Cleveland 11, Ohio

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• Now you can specify by brand name the gears or assemblies you need and be sure that every desirable quality for longer life and lower service cost will be built into them. This name—*Certified* BRAD FOOTE Gears.

Certified BRAD FOOTE Gears are made according to an exclusive BRAD FOOTE formula which controls every step in the manufacturing process. It is your assurance that the gears will have long-wearing teeth and bearing areas, and tough cores that will give service equal to or better than any other gears made.

Copper Plating* permits smooth, quick run-in. It is clean and prevents rust and corrosion before gears are put in service. It's your positive identification of the best gears that money can buy. *Yet . . . you pay no more.*

The Certificate furnished with *Certified* BRAD FOOTE Gears and assemblies certifies strict adherence to specifications and the exclusive BRAD FOOTE formula. It proves that "*no one shares our responsibility.*"

**Gears over 30" diameter are protected by copper-colored water-soluble paint which need not be removed before placing in service*

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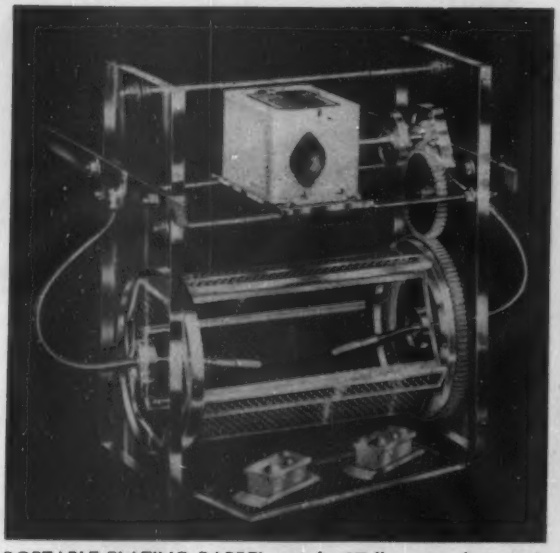
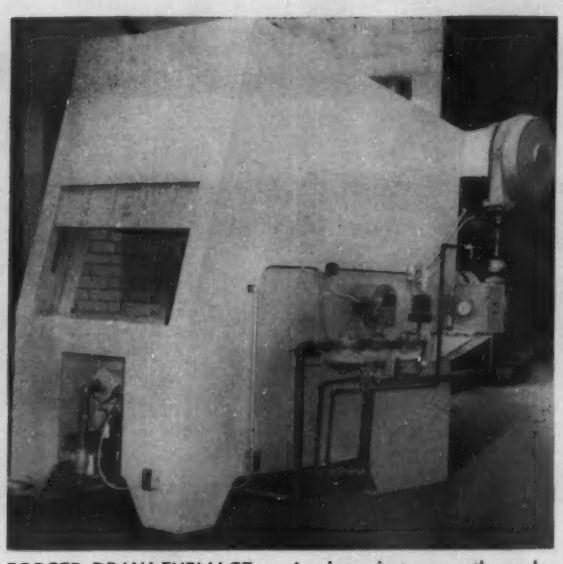


PORTABLE PLATING BARREL weighs 27 lbs, was designed for small quantities, is fabricated in acrylic. Driven by torque-rated geared motor, barrel uses standard electric supply. Inside dimensions are 6x12 in. with 3/32-in. perforations. Gears and sides are ⅜ in. thick and withstand 180 F. All metal parts exposed to plating solution are made of Monel—*Starline Products, 1717 N Main St, Los Angeles 12, Calif*



FORCED DRAW FURNACE, recirculates hot gases through work chamber at 70 changes per min. Door is air-operated; sloping front provides tight seal. Temp range is from 250 to 1250 F. Others are available rated to 1650 F in wide range of sizes, with manual, air, hydraulic, or electric doors, either gas-fired or electrically heated —*Bellevue Industrial Furnace Co, 2620 Crane Ave, Detroit 14, Mich*

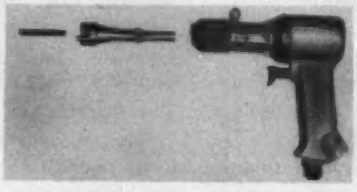
Lynair Collet Chuck Is Air-Operated

Air-operated collet chuck is actuated by heavy-duty air cylinder through gear train. This is accomplished by means of lock ring and bottom of fixture; collet is opened and closed by means of separate sleeve on outside. Once collet is closed it will not release, even though air-pressure failure may occur. Collet remains stationary in position at all times to assure use of controlled depth. Lynair also states the positive holding of lightest plastic to heaviest steel or cast-iron parts is done without damage to any of the outside surfaces.

Collet chuck is a completely self-contained unit; can be mounted either horizontally or vertically. Operation can usually be coordinated with drillpress spindle, milling machine table, etc.

Unit can also be finished with expanding type collet. Capacity ranges from 1/16 through 3¾ in. Stock diameter up to 1⅜ in. can be passed through collet.

Lynair, Inc, Jackson, Mich



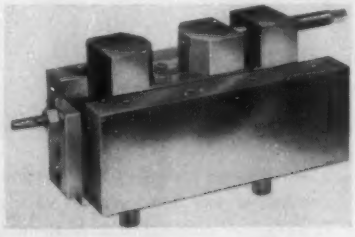
Power Tool Set Drives Rollpin Fasteners

Standard Ingersoll-Rand pneumatic aircraft riveting hammers, AVC-10, 11, 12, and 13 can be equipped for driving rollpins with special driving head.

Slot along edge of driving head allows starting rollpin while retaining finger hold. Central hole in head does final driving, or face of the set may be used to drive pin flush with edge of work.

Throttle control on air hammers permits starting the pin with slow light blows and finishing off at maximum power.

Elastic Stop Nut Corp of America, Union, NJ



Sliding Workholder

Horton announces sliding pinch-type unit for holding thin walled parts in position on chucks or face plates. Units are mounted in T-slots of face plate or chuck in whatever quantities and combinations required. It features special floating arrangement for quick self-alignment to conform to shape of work piece. Jaws having pinching action, hold piece in position ready for machining and minimizes distortion of thin-walled pieces. Like the J-type chucks, it has pinching capacity up to 1½ in. in thickness and diameter capacity is limited by size of chuck.

Horton Chuck, Div E Horton & Son Co, Windsor Locks, Conn

*REO DESIGN ENGINEERS SAID...

TOUGH JOB?

WE'LL SPECIFY

STRESSPROOF®

SEVERELY COLD-WORKED, FURNACE-TREATED STEEL BARS

AGAIN!

*Reo Motors, Lansing, Mich., have again specified STRESSPROOF—this time for the power shaft on their new rotary lawn mower.

Another
Reo Lawn Mower
to Use STRESSPROOF

Reo engineers needed *top performance* from this new drive shaft . . . so they insisted on STRESSPROOF! They knew from years of successful experience with STRESSPROOF that it could take abuse. It had both the strength and wearability to stand up under the toughest service—and its excellent machinability was most welcome from a cost standpoint.

The alternative to STRESSPROOF would have been a heat-treated part, with the attendant cleaning, straightening, and machining problems.

Only STRESSPROOF gives you a unique combination of four qualities *in-the-bar:* Strength, Wearability, Machinability, and Minimum Warpage. Yet it costs less than the other quality cold-finished steel bars.

STRESSPROOF makes a better part at lower cost! It is available in cold-drawn or ground and polished finish.

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Manufacturers of the Most Complete Line of Carbon and Alloy Cold-Finished and Ground and Polished Steel Bars in America.

La Salle Steel Co.
1416 150th Street
Hammond, Indiana

Please send me your STRESSPROOF Bulletin.

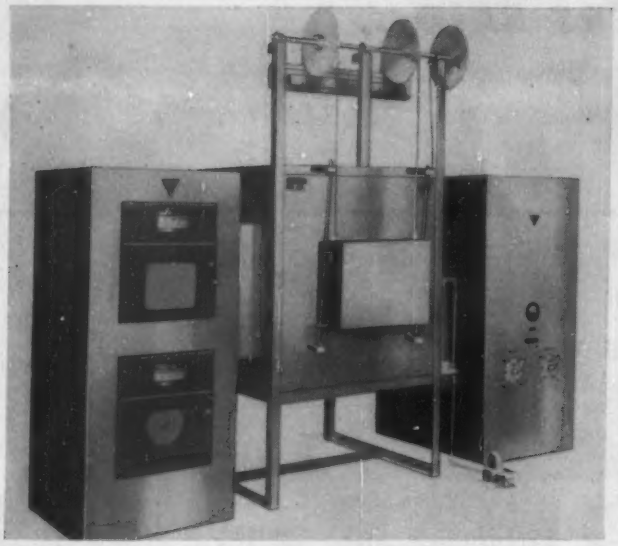
Name _____

Title _____

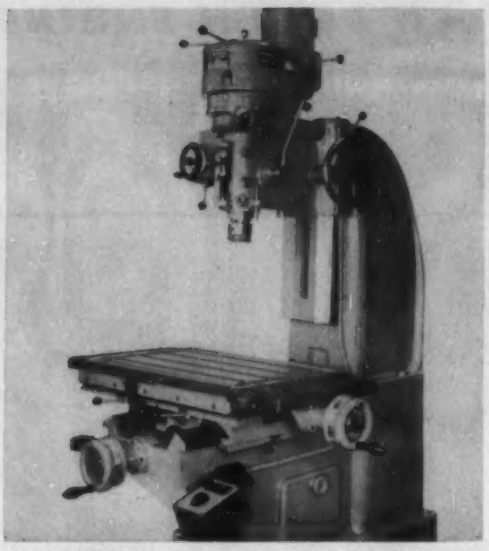
Company _____

Address _____

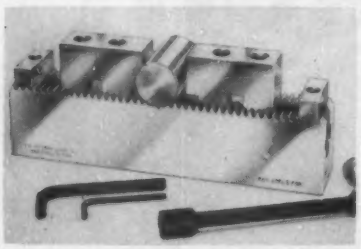
City _____ Zone _____ State _____



TEMPERATURE CONTROL, indication, and permanent record, plus automatic time-temperature program control for heating and cooling, are built into all-steel panel of general-purpose heat-treating furnace. A Wheelco Capicilog is used and design allows max temperature of 2700 F. Plug-in design is said to offer flexible control system and simplify service. Heating and cooling cycles range from 4 hr to seven days—*Pereny Equipment Co, 893 Chambers Rd, Columbus 12, Ohio*



SIMA JIG BORER features 32x20-in. hand-scraped working surface and table carriage V-ways, is reported to have max accumulative error of 0.0006 in. on longitudinal and cross travel. 16 spindle speeds range from 35 to 1500 rpm. Throat is 14 in.; spindle nose distance from table surface, 0 to 20 in.—*Imported by Amitool, 629 Main St, Westbury, NY*



Pinch-Type Chuck Has Wide Utility

Cushman is producing new pinch-type chuck and face-plate jaw reported to have wide utility in metal-working industry. Jaw was developed originally for use on Cushman jet engine chucks for precision machining of jet engine disks and rings, but is now added to company line.

Chuck can be mounted on face plates, milling machine or jig boring machine tables, and because of two-piece jaw construction may be used with soft blank top jaws machined as required for special work-holding applications. Cushman states that the holding problem these chucks solve is that of permitting work to be accurately positioned and centered without danger of distortion and firmly gripped for machining without distortion or change of position.

The Cushman Chuck Co, Hartford, Conn

Jig and Fixture Bodies

Smith jig and fixture bodies are cast, made with ground parallel sides and base plate, and come in 7500 stock sizes. They are reported to be easily adapted to nearly every type of tumble fixture problem simply by adding jig feet to any side.

Units are manufactured in one universal shape—finished on top, bottom, and all inside surfaces. Range of sizes is as follows: 1 to 12 in. long in ½-in. steps, 1½ in. to 12 in. wide in ½-in. steps, 1 to 5 in. high in ¼-in. steps.

Smith Engineering & Tool Co, 191 Bay Ave, Glen Ridge, NJ

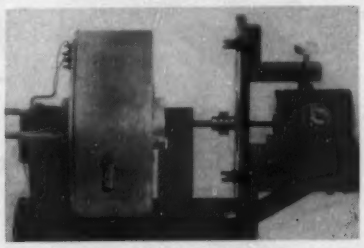
DC Arc Welder Has Flexible Control

Remote-control "Aircrafter" welding machine has current capacities from 5-95, 12-180, and 55-300 amps in three ranges.

Automatic shutoff works when current reaches minimum, and unit may be operated to eliminate craters and refine metal at bead end.

Primary contactor, control transformer, and footswitch are supplied. Rectifiers (selenium) are special for welding. Parallel operation is possible.

Miller Electric Mfg Co, Appleton, Wis



Dynamometers for Motors of 2 hp and Less

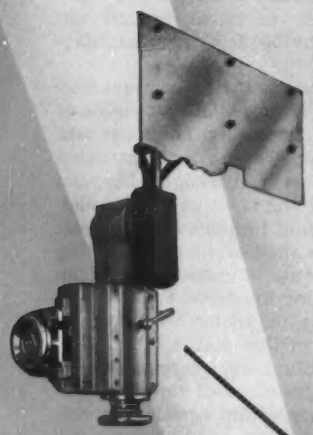
Dyna-Chek Model DM-3 measures hp output of electric motors of 2 hp and less and Model MDM tests motors of less than 1/10 hp. The manufacturer states that precision machining and accurate balancing are combined with simplified controls and multiple-range wiring and that Dyna-Chek has been thoroughly tested and proven in test laboratories of Western Gear Works. First unit provides accuracy to 2%, second to 0.1%.

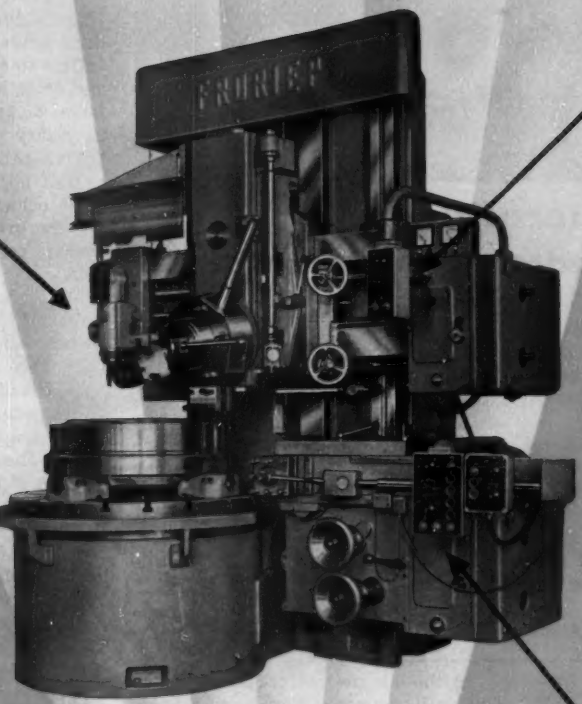
Two sets of torque arms are provided to add to flexibility of instrument. Minimum torque practically measured within ± 10% accuracy is 3 oz-in.; max recommended torque is 1000 oz-in. Maximum recommended absorbed horsepower is limited to 2 hp.

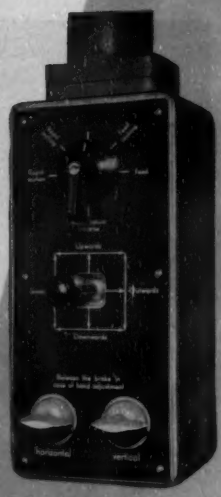
Mission-Western Engineers, Inc, 138 West Colorado, Pasadena 1, Calif

FRORIEP

KE super







The electrically controlled Vertical Turret Lathe with electric tracer

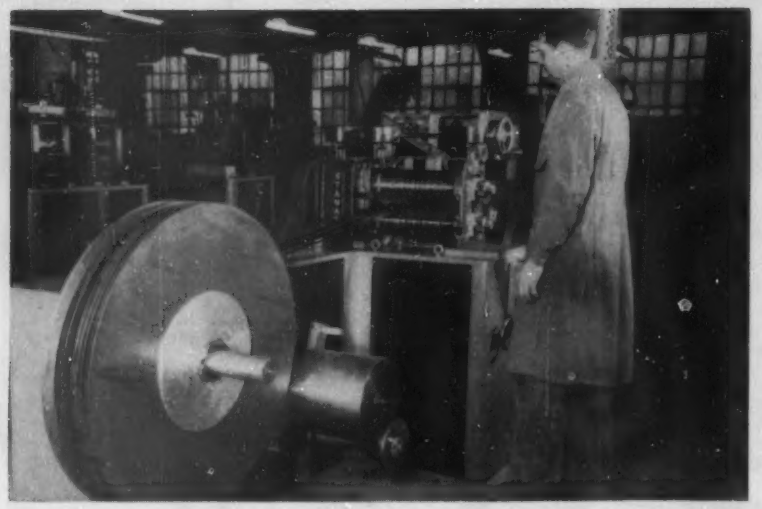
table diameters: 40" - 49" - 55"

MASCHINENFABRIK **FRORIEP** GMBH, RHEYDT (RHLD.)

Representative in USA: Cosa Corporation, Chrysler Building, 405, Lexington Avenue New York 17 NY

Representative in Canada: B. E. L. A. Kipling A. V. E. S. Hollywood P. O. Toronto 14

All machines serviced by FRORIEP Machine Service Corporation (America).



Two Stanat Slitters Have 2½-, 3½-in. Arbors, Large Cutters

Model S-180 has 2½-in. arbor, model S-350 has 3½-in. arbor or larger for coil widths of 8, 12, 18, 24 in. or larger. Standard interchangeable parts simplify adapting machines to work.

Units feature double set of roll bearings, outboard bearings, optional worm-gear screwdown arrangement, scrap disposal on tension-controlled arbor, and large cutters; 5½-in. dia that can be reground down to 4½ in. before disposal, and 8-in. cutter on model S-350.

Uncoiling attachments, optional, include expanding drum or cradle. Recoiling can be done on plain arbor, solid drum, core plate, or expanding drum. Capacities vary up to 6000 lb.

Machines are designed with minimum built-in gadgetry, but are adaptable for attachments of many types, including entry and exit rolls, stock guides, feed and runout tables, and special equipment.

Recoiler tension control is unique feature.

Stanat Mfg Co, 47-30 37th St, Long Island City 1, NY

Portable Electronic Controller-Indicator

Safe-Temp instrument is usable as automatic temperature controller or excess temperature cut-off, or to verify temperatures of controllers in use. It will directly measure and control temperatures of ovens, furnaces, liquid baths, and other related controlled equipment.

Although unit is portable it may be wall-mounted. Where atmosphere is hazardous or corrosive, it may be remote wall mounted. Unit features circuit breaker switch which gives full protection against shorts and overloads; no fuze is required.

Units are available in two scale ranges with either Chromel-Alumel or Iron-Constantan thermocouple. Each unit is supplied with 18-in. long No. 8 gage thermocouple and 10 ft of lead wire.

Blue M Electric Co, 306 W 69th St, Chicago 21, Ill

Plews Oiler Features Seamless Spout

Improvements in Plews' line of pistol and pump oilers include a seamless spout replacing solder spouts, a leakproof coupling for all oilers with interchangeable spouts, new method of attaching spout to container and one-piece drawn steel base.

Plews Oiler Co, 701 S 7th St, Minneapolis, Minn

Adjustable-Torque Driver Eliminates Tap Breakage

Tap driver featuring adjustable torque and full-releasing roller drive is reported to have reduced tap breakage by 500% by the manufacturer.

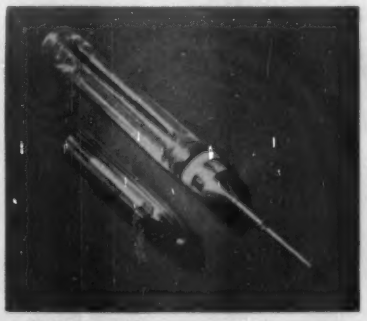
Driver releases without usual friction, heat, or wear. Drive consists of drive shell, two rollers and inner cam drive collet. Torque is transmitted when rollers are wedged between drive shell and cams on drive collet. When driving torque exceeds preset limit, drive shell expands, permitting rollers to enter a cylindrical portion and releasing the drive. Friction surfaces, disks, or ratchet teeth are not necessary in this design.

Five settings on standard drivers permit adjustment of torque so release occurs within certain percentage of breaking point. Torque remains constant once it is set, providing more dependable control.

Scully-Jones states that another important feature of the Safe-Torque driver is its ability to operate at maximum speeds when bottoming. A spring-loaded centering plug behind collet permits machine spindle to advance slightly after roller-drive releases, absorbing shock when tap hits bottom of hole. Operator can bottom tap at high speeds.

Three standard assemblies are available for No. 8-32 to ¼ in., 5/16 to 7/16 in., and ½ to ⅝-in. tapping ranges. Torque settings range from 55 to 660 in.-lb. Small diameters, 1⅝ in., 2 in., and 2½ in., permit use on close-center work. Drivers may be used for tapping on radial drills, horizontal boring mills, multiple spindle drills, and other machines with reversing spindle.

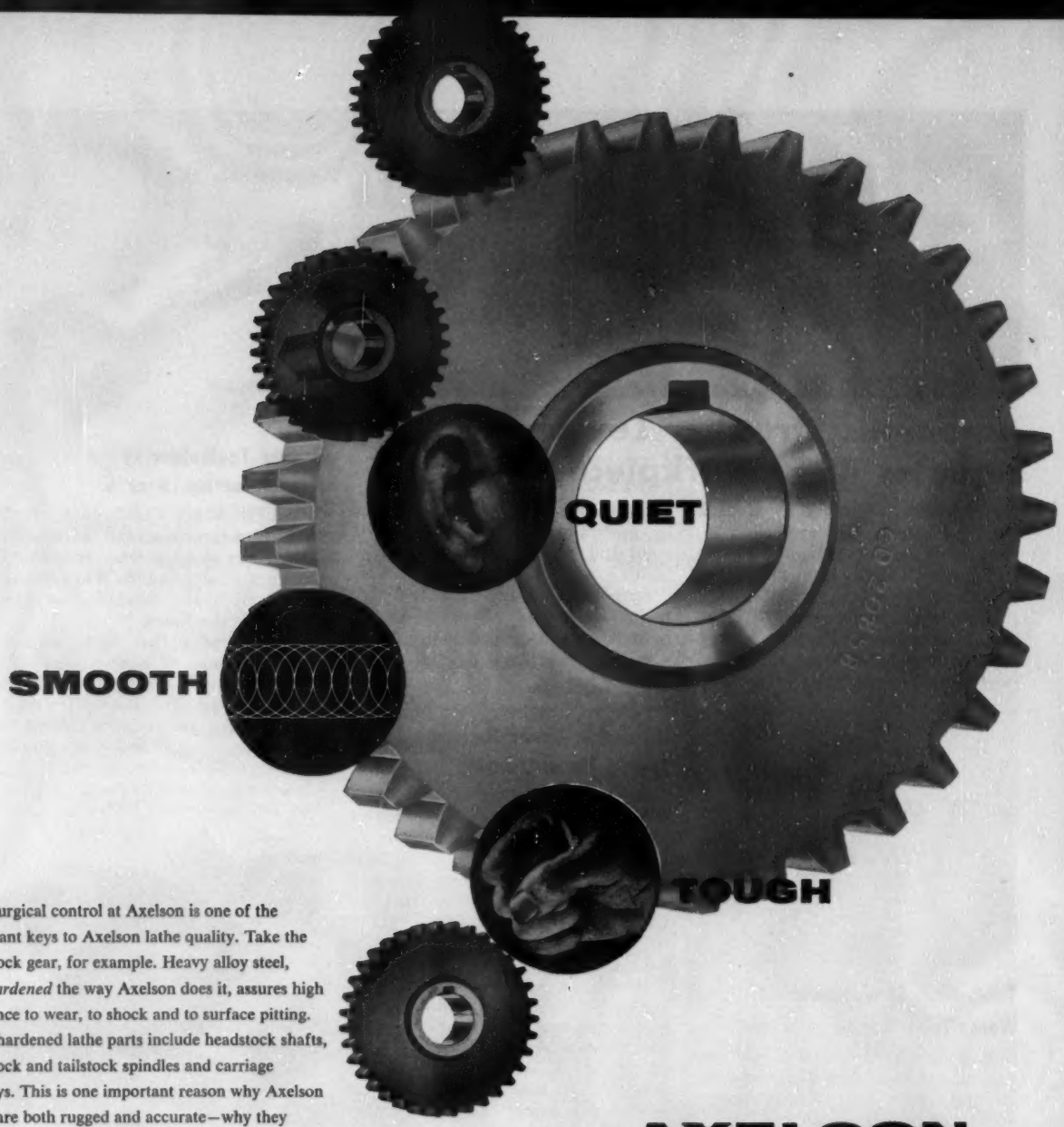
Scully-Jones & Co, 1901 South Rockwell St, Chicago 8, Ill



Pell-I-Can Oiler

Leakproof refillable pen-size unit has visible oil supply and pocket clip and is designed for servicing small appliances.

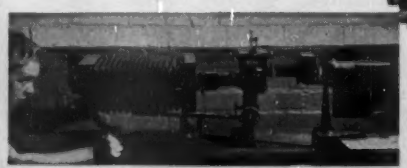
Lofthouse Co, Box 832, Binghamton, NY



Metallurgical control at Axelson is one of the important keys to Axelson lathe quality. Take the headstock gear, for example. Heavy alloy steel, *case-hardened* the way Axelson does it, assures high resistance to wear, to shock and to surface pitting. Other hardened lathe parts include headstock shafts, headstock and tailstock spindles and carriage bedways. This is one important reason why Axelson lathes are both rugged and accurate—why they maintain their precision for long periods even under the heaviest work load. Axelson is the master of meticulous detail. Below, a few of the check points in the Metallurgy Department.

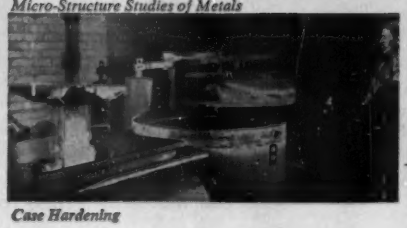
AXELSON LATHES

Hardness Testing



Micro-Structure Studies of Metals

Carbon Content Analysis



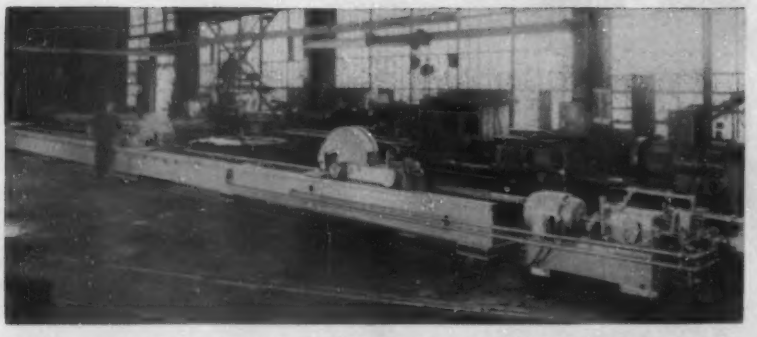
Case Hardening

16" Precision Tool Room Lathe

AXELSON
MANUFACTURING COMPANY DIVISION
PRESSED STEEL CAR COMPANY, INC.
LOS ANGELES 58, ST. LOUIS 16, NEW YORK 7, TULSA 1

RAILROAD FREIGHT CARS • STANDARD PARTS
DAIRY & FARM EQUIPMENT • WASTE CONTAINERS
STAINLESS STEEL COOKWARE • CAR ACCESSORIES
TANKS • AGITATORS • SMOKE STACKS • DUST
COLLECTORS • COAL & ASH HOPPERS • FITTINGS & ELECTRICAL
ACCESSORIES • ORDNANCE MATERIEL • UNSHELTER RELOCATABLE
HOMES • EXPORT ONLY: LOCOMOTIVES & TRACKWORK • CARS
(MINE, ORE, CANE, INSPECTION) • UNISTRUT METAL FRAMING
WEED MOWERS • BRICK & TILE MACHINERY • CANE LOADERS

LATHES: ENGINE • TOOL ROOM • HOLLOW SPINDLE
BAR REX • PETROLEUM PUMPING EQUIPMENT:
DEEP WELL PLUNGER PUMPS • SUCKER RODS • HY-
DRAULIC PUMPING UNITS • AIRCRAFT COMPONENTS
L-48



Automatic Stretcher Leveler Handles 45-ft Workpiece

Model SL50-8/4-45 made by Medart, has three speeds, will produce a 50-ton stretch continuously, and can be adjusted for lengths from 45 ft down to 10 ft in 30 sec.

Work is placed between grip jaws, then pushbutton makes jaws clamp. Automatic cycle includes high-speed takeup and low-speed stretch, then work release. Rapid resetting is aided by gearmotor-powered head movement and extension or retraction of holding pins by air-cylinder action.

Anti-friction bearing rollers mount both heads, and added rollers at bottom prevent kick-up.

The Medart Co, 3535 DeKalb Ave, St Louis 18.

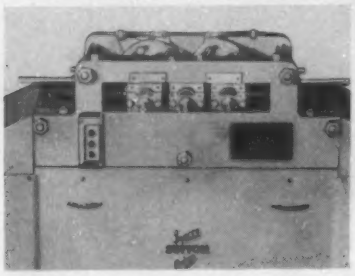


Table-High Straightener Works Tube, Bar to ⅝-in. dia

Sutton Synchro-Drive unit has five rollers, all angularly adjustable for spacing, with two driven rollers and three pressure rolls.

No. 00 has capacity of ⅛ in. to ⅝ in., operating at 60 to 300 fpm, powered 2-hp variable-speed drive. Other sizes handle stock down to 1/16-in. OD on all metals. Design has coordination between rolls to permit constant surface speed for opposed rolls, which yields longer roll life and automatic centering without guides.

Size is 5 x 3½ x 3 ft

Sutton Engineering Co, Bellefonte, Pa

Kiwi Pressure-sensitive tape printer marks creped or flat back masking tape and pressure sensitive cloth tape with code dating name markings, numbers or identifications, feeding one imprint at a time or continuously.

Kiwi Coders Corp, 3804 N Clark St, Chicago 13

Ultrasonic Generator Speeds Metal-Cleaning

Model 500 ultrasonic power generator was designed to accelerate cleaning and degreasing of small parts. It functions by activation of solvent in which low-voltage focused ceramic transducer is immersed. Installation in conventional vapor-degreasing systems is facilitated by long cables.

Rf output is 500 watts at 450,000 cycles. Standard transducers are sections of 6-in.-dia cylinder of barium titanate with surface of 15 or 30 sq in. In addition to cleaning, Sonogen 500 is source of ultrasonic power for many other laboratory and industrial uses.

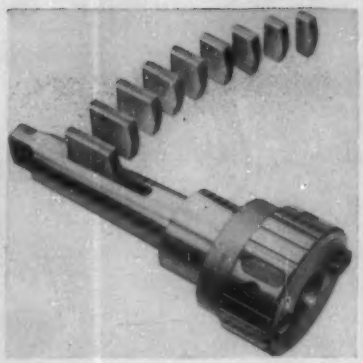
Branson Instruments, Inc, 430 Fairfield Ave, Stamford, Conn

Electronic Temperature Controller Is Two-Zone

Two-zone electronic temperature controller developed by Robertshaw-Fulton was designed for a wide range of industrial applications. It uses a resistance temperature-detector element as a sensing device in a bridge circuit in conjunction with a high-gain phase-sensitive amplifier unit.

Single dial sets temperature control point and red and green lights indicate whether temperature is below or above set point. Standard ranges are zero to 100, 300, or 500 F.

Fieldon Instrument Div, Robertshaw-Fulton Controls Co, 2920 N 4th St, Philadelphia, Pa

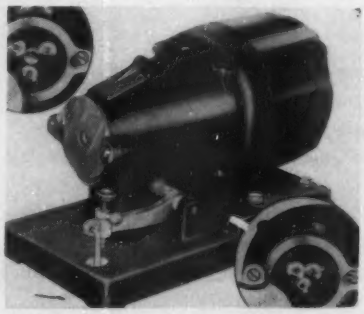


Beaver Toolholder Fits Morse No. 5 or 6

A quick-change toolholder with Morse taper shank and adjustable keeper key slot has been announced to fit practically any No. 5 to 6 Morse taper spindle on American or foreign-made machines.

Adapter plug that helps adjustment is made of high-quality oil-hardening steel and heat-treated to resist damage from the keeper key. Adapter plug is precision ground to match Morse taper and is prevented from shifting by precision fit.

Beaver Tool and Engineering Corp, Box 429, Royal Oak, Mich



Self-Centering Wire Stripper Provides Extra Cutting Edge

Triple-disk cutting mechanism automatically centers the wire it strips of insulation and provides its own extra cutting edges. Insulation is removed by three hardenend steel disks angled into cutting position to slightly overlap each other. Slight pressure on core of wire at intersection of three arcs centers work.

Stripper is a ¼-hp bench model designed for high-speed production-line work; it removes all insulation including plastic types from solid, stranded, or multi-conductor wire. Provision has been made for adjustments for diameters up to ½ in. and for strips to 1½ in. in length.

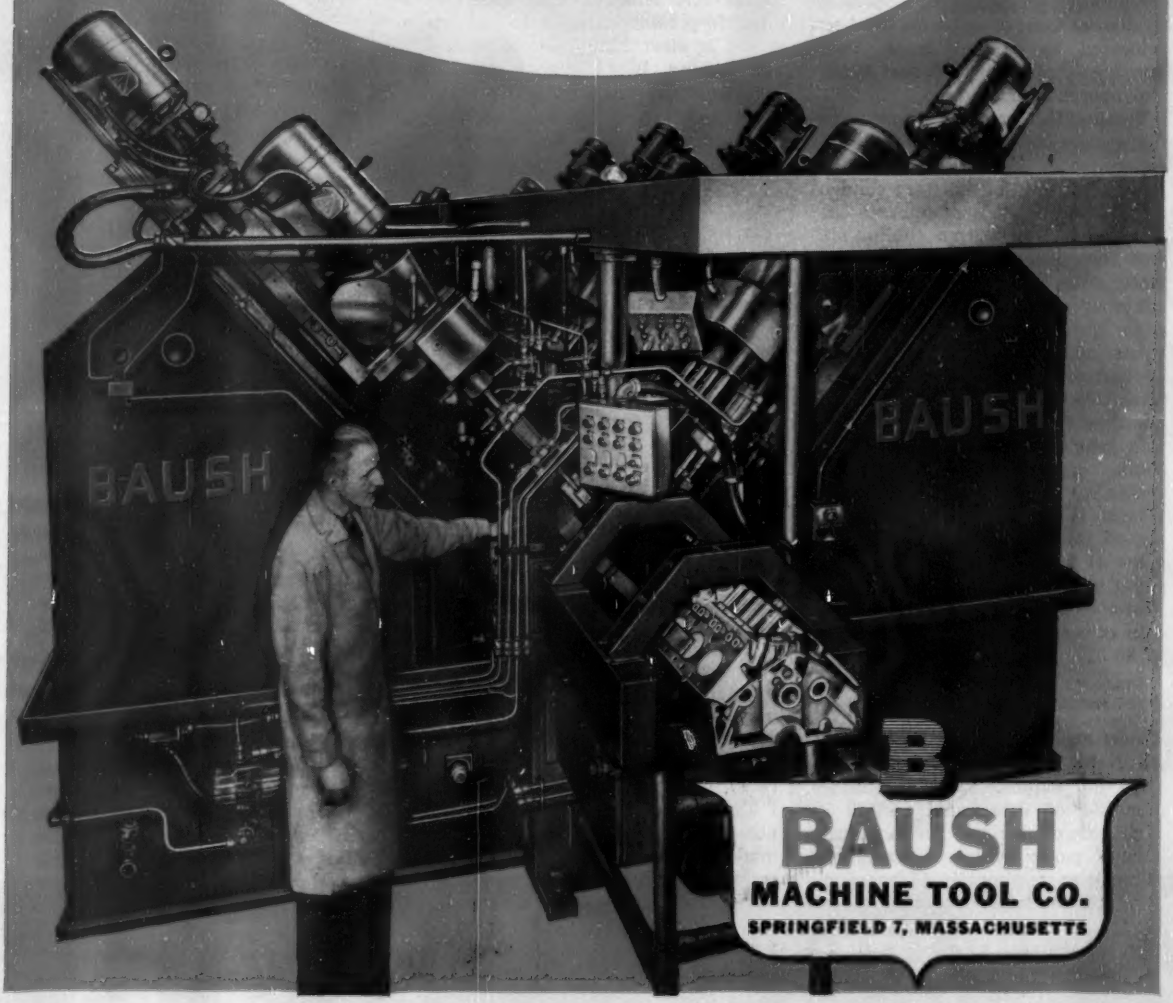
High Speed Hammer Co, Inc, Rochester, NY

BAUSH

AUTOMATIC TRANSFER LINE . . .

Insures high production — maintains accurate work — produces more — in less time and at lower cost!

This 20-station Baush Automatic Mechanical Transfer Machine is furnished with fourteen (14) mechanical leadscrew units and two (2) special units and has checking fixture at Station 6. All made to J.I.C. Standards. . . . All units and heads are readily accessible for tool changes. . . . 105 machine operations completed on bank faces with a production of 109 V-8 cylinder blocks per hour at 100% efficiency . . . There is a Baush representative ready to work with you on your machine tool planning and production. Why not send us your prints—avail yourself of our more than 60 years of experience.



BAUSH
MACHINE TOOL CO.
SPRINGFIELD 7, MASSACHUSETTS

Induction Heating Unit For Rugged Use

Redesigned 5-kw high frequency induction heating unit, Model LI-5A-1, incorporates heavier sheet steel cabinet for rugged industrial use to insure minimum rf radiation and comply with FCC regulations. Interior steel partitions are provided to isolate oscillator, power, and control components, accessible for inspection. System of indicating lamps has been relocated to cabinet front; these lamps instantaneously reveal abnormal operating conditions.

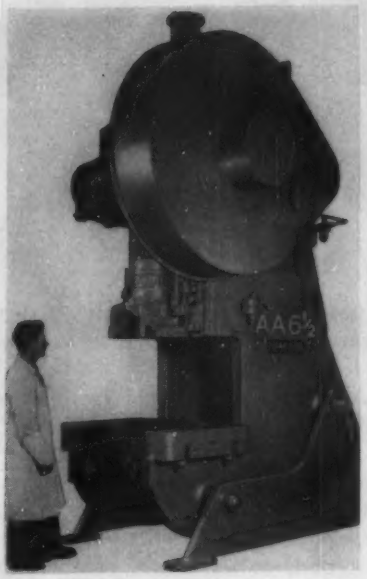
Temperature-controlled water cooling system has been redesigned to reduce water consumption and eliminate possibility of moisture condensation on internal components and work coils. Non-ferrous cooling system incorporates molded porcelain water coils to form insulating water columns eliminating rubber or organic hose. Electrical interlock prevents application of power when cooling water is not flowing. Industrial tubes are provided with constant voltage transformers to maintain proper tube filament voltage. Tank capacitor is hermetically sealed.

Unit is single-station model designed for the continuous output of 5 kw at frequency of 450 kc. Power input is 230/460 v, single phase, 60 c. Water consumption is 2 to 3 gal per min at maximum inlet temperature of 86 F.

Lindberg Engineering Co, 2450 West Hubbard Street, Chicago, Ill

Power rapid traverse is available for all Nebel engine, removable block gap, and extension bed gap lathes. Consists of directional switch on right side of carriage, Welco pancake torque motor which operates carriage at approximately 45 fpm, junction box and trolleys, and double bus ducts.

Nebel Machine Tool Co, Cincinnati 25, Ohio



Electro-Pneumatic Clutch Feature of Niagara Press

Series AA Niagara open-back inclinable presses incorporate a clutch which is electrically controlled and air-actuated. It is stated to combine the advantages of both friction and mechanical-sleeve clutches. Assuring positive drive, it may be engaged or disengaged at any point in the stroke. It can be single-stroked, jogged, or run continuously and, as a safety feature, stops automatically if power or air pressure fails.

Utilized for blanking, forming, drawing, perforating, and in combination die and automatic feeding operating, OBI presses may be fed from either side, front, or back. Work can be discharged through opening in bed or opening in back. Press is available in eight sizes with shaft diameters ranging from 3 to 7½ in.

Additional information is contained in manufacturer's bulletin 57-A.

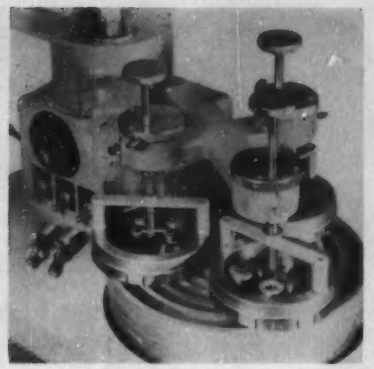
Niagara Machine & Tool Works, 683 Northland Ave, Buffalo 11, NY

Automatic Tag Printer

Jiffy printer will imprint over 200 characters on eleven separate lines in a single impression at the rate of 1000 tags per hour, if they can be fed that fast. Type is set up from 42-row rack.

Type is handled by a fork and is not touched by hand. Impression is made from a ribbon that reverses as on a typewriter. Special trademark signatures and repeated copy made into a slug can be reproduced. A tag feeding attachment is also available.

American Tag Co, Belleville 9, NJ



Method for Lapping Shaft Shoulder Faces

Method consists of providing lap plate with series of annular grooves to accommodate stem of workpiece and allowing shoulders to ride top of lap plate during cycle. Fuel pump parts are preloaded into special brass cylindrical workholder which has been bored out slightly oversize to diameter of workpiece. Special workholders provide necessary weight and balancing properties.

Adjustable roller guides located at base of conditioning ring guide stems are so located to perimeter of workholder that parts being lapped will be held in proper position. Ball bearing races in guides reduce friction to a minimum and work is free to rotate in own orbit on lap plate.

In order to overcome wear caused by work on lap plate, conditioning rings are spring loaded. Thus conditioning rings apply greater force on lap plate. Amount of spring tension is controlled by set-screw and indexing measure is provided on spider bar arm cap.

Crane Packing Co, Dept AMN, 1800 Cuyler Ave, Chicago 13, Ill

Alco Magazine Attachment For B&S Automatics

Magazine attachment for B&S automatic screw machines permits second-operation work to be performed semi-automatically. It consists of complete setup, including magazine for holding and carrying work to chuck, cams, form tools, and chuck with ejector and inserting tool.

No extra drilling or fitting is necessary when attaching the magazine. It is mounted on front cross-slide of machine and one operator can handle additional automatics while keeping chute in magazine filled. Parts can be automatically ejected and dropped into work pan.

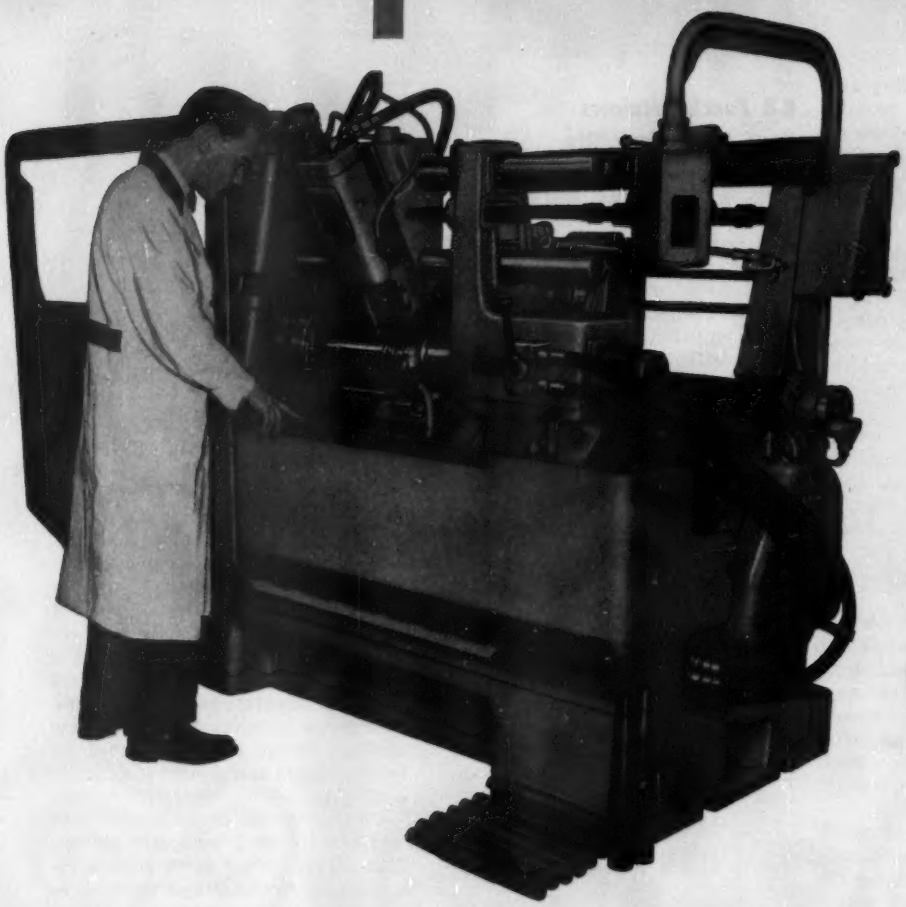
The Alco Tool Co, 152 Birdseye St, Bridgeport 4, Conn

IT'S COSTING YOU MONEY NOT TO BUY IT!

PILOT

COMPLETELY AUTOMATIC

high speed HYDRAULIC COPYING LATHE



The machine that amazed visitors at the A.S.T.E. Exposition

Write, wire or telephone us now for a demonstration or comprehensive catalog.

YOU'RE LOSING MONEY EVERY DAY on all the parts you turn with your present equipment because they would cost less on the H.E.B. Pilot. In today's competitive market you cannot *afford* to use yesterday's methods and machines.

The Pilot copyturns faster and with less tooling and labor; produces better finish and accuracy, considerably reducing grinding costs. Spindle speeds to 3,000 RPM; motors to 60 HP. Completely built in Lansing, Mich. by Industrial Metal Products Corp.

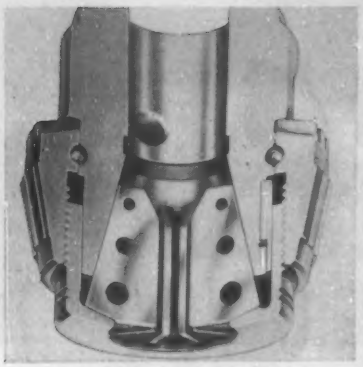
H·E·B

"THE WAY TO TURN"

H.E.B. MACHINE TOOLS, INC.

475 Fifth Avenue, New York 17, N. Y. • LExington 2-0266

COPYING LATHES • ENGINE LATHES WITH COPYING ATTACHMENTS • CARBIDE TOOL GRINDERS • RADIAL DRILLS



Jacobs Collet Chuck for Variety of Machine Tools

Model 96 is a new toolholding and workholding chuck which permits use of Jacobs Rubber-Flex collets on many different machine tools—grinders, milling machines, jig borers, jig grinders, lathes, and special machinery.

Model 96 is made in two types, differing in back mounts. The 96-05 is equipped with No. 5 Jacobs taper back mount; 96-F1 has flange mount. Both have hardened steel one-piece body. Conical bore in front of body centralizes Rubber-Flex collets.

Mounted on the body by means of a deep-groove ball bearing is a hardened steel geared sleeve having a ground threaded bore engaged with collet-closing nose of chuck. Nose is of hardened steel and all working surfaces, including threads, are ground.

Initial engagement of part is accomplished by hand rotation of sleeve. Final locking is effected by clockwise rotation of geared key. Chuck will hold round bars of diameters from 1/16 to 1 3/8 in. by using eleven Rubber-Flex collets. Each chuck is checked with a complete set of collets.

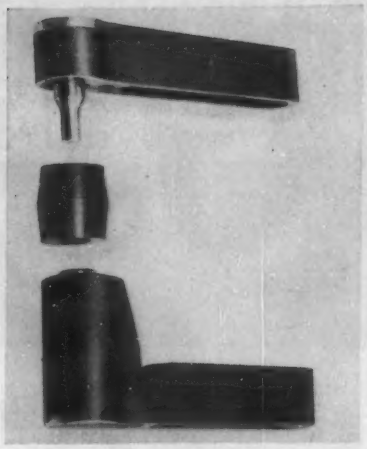
Unusual gripping power of chuck is said to be due to: mechanical advantage of geared key locking device; self-tightening toggle action derived from resiliently supported jaw elements when torque is applied.

Rubber-Flex collets are permanent assemblies molded into one piece, composed of hardened steel jaws, separated and supported by compound of Hycar, oil-resistant synthetic rubber.

Multiple parallel jaws with cone bearing surfaces distribute grip equally. Range of collets is 1/8 in. (smallest has 1/16-in. range).

Price of 96-05 is $135; 96-F1, $150. Collets are $12 each.

The Jacobs Manufacturing Co, West Hartford 10, Conn

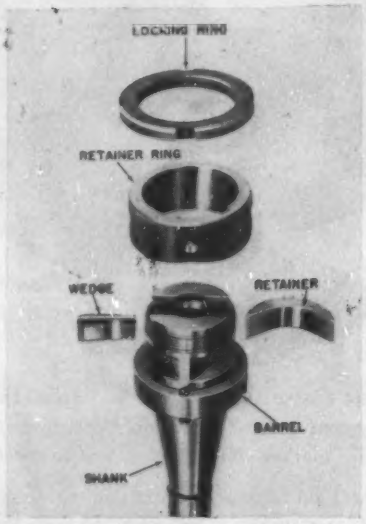


R-B Punch Retainers Have More Flexibility

Retainers for punch-shank diameters of 3/8, 5/8, 7/8, and 1 in., and die button OD's of 5/8, 7/8, 1 1/4, and 1 3/4 in. are included in a new line for low-cost tooling.

Retainers are suitable for short runs on light-gage materials and are easily adjusted to position on T-slotted or drilled and tapped commercial die sets. Rubber strippers or rubber-covered springs eliminate costly metal strippers.

Allied Products Corp, Richard Brothers Punch Div, 1560 E Milwaukee Ave, Detroit 11

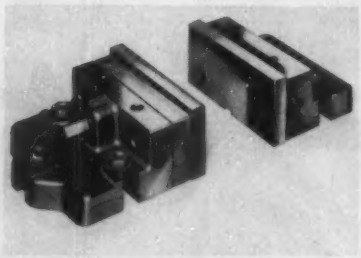


Wej-Lok Toolholder Grips End Mills

Detroit Reamer is marketing a positive-lock toolholder with solid machined shank and barrel, separate wedge, retainer, retainer ring, and locking ring. Wedge keys into recess into recess in tool shank for positive location, permitting use of Baker drive on large tools or for heavy cutting operations.

Right-hand or left-hand tools may be operated; the change-over takes a minute and consists of removing the rings, reversing the wedge, and re-assembling the rings. Normal locking is done by hand, but spanners may be used also. Locking ring is claimed to prevent loosening of the retainer ring by vibration and to eliminate tool backlash.

Detroit Reamer & Tool Co, 2830 E Seven Mile Rd, Detroit 34, Mich



Metalworking Vise

Repco vise set consists of two independent members and utilizes any T-slot table as its base. Capacity is limited by length of machine table. Clamped work is reportedly held more rigidly since work locates directly on machine table.

Special soft jaws are available to hold shafts between centers for milling slots, flats, and keyways. Used independently, rigid base serves as useful angle block and adjustable clamp base can be used as separate clamping device. Key slots are provided in both directions and eight conveniently located 1/2-13 tapped holes accommodate hold-down straps. Clamp jaw is driven by Acme screw through bronze nut and guided by two hardened and ground steel guide pins.

Vise is available either in jaw widths of 6 or 8 in. and with key slots of 11/16 or 13/16 inches respectively. Wrench and one set of soft jaws are included.

Rockford Engineered Products Co, Rockford, Ill

Diamond Wheel Develops Less Heat

Robot resin diamond wheel for dry grinding is said to have longer life and cooler cutting action because less heat is developed. The bond is non-loading so there are less frequent redressing operations and longer wheel life.

Action Diamond Tool Co, 4545 W Grand Ave, Chicago 39

PROPER CONTROL OF AIR WITH *NORGREN* VALVES

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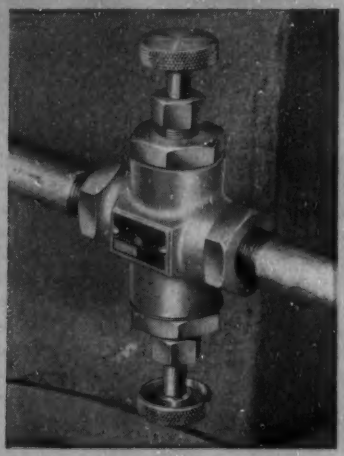
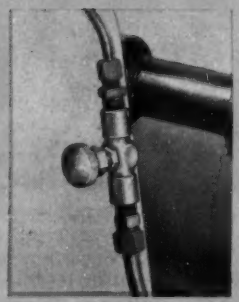
Automatic Relief Valves protect equipment from damage resulting from excessive pressure build-up and provide controlled operation of fluid recirculating systems. ¼" to 1".



Adjustable Air Governors
Improve cylinder performance by accurately regulating work and return strokes. Two-way and single-way for lines carrying air, oil, water, steam, non-corrosive gases and liquids. ¼", ⅜", ½".

Blow Guns
For removing dust, chips, water, etc., from parts in production, work benches, machinery, dies, testing devices, office machines. Lever, button and flex types of air controls.



Needle Valves
Provide an adjustable orifice for controlling the rate of flow of air, liquids, and gases, or for use as shut-off valve. Pressures up to 250 psi. ⅛", ¼".

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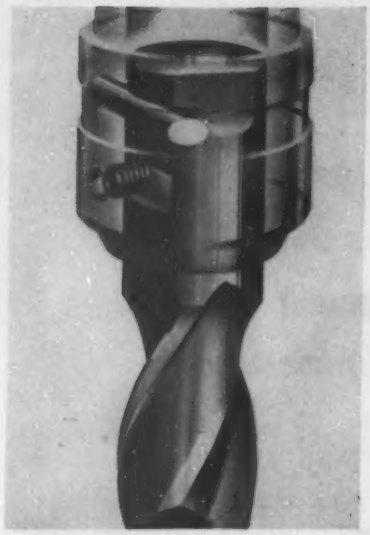


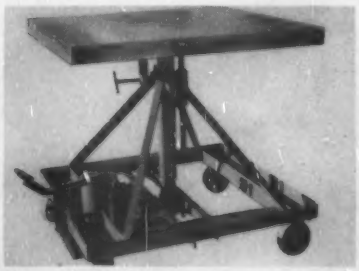
Positive-Lock End Mills

Putnam Tool Co claims tool-cost savings up to 25% with end mills ranging in size upward from 1½ in. dia, made to replace integral tapered-shank end mills on large boring-mill, profiling, and duplicating jobs.

Tool shank is inserted in holder so flat passes locking pin, then is rotated a quarter turn to lock it. Setscrew prevents backlash. Units are claimed lighter and easier to manage than tapered-shank end mills.

Adapters for shell end mills and end mills under a 1½-in. dia are available to permit a variety of milling operations without using different holders.

Putnam Tool Co, 2981 Charlevoix Ave, Detroit 7, Mich



Portable Table Lift

Portable table lift has flat steel swivel top and is used to handle heavy jigs and dies to 2000 lb. Mounted on large ball bearing wheels and raised hydraulically with foot pump, unit serves as sheet or strip feeding table, portable elevator for loading trucks, storing tools and dies, or as temporary workbench. It has a lift from 28 to 42 in.

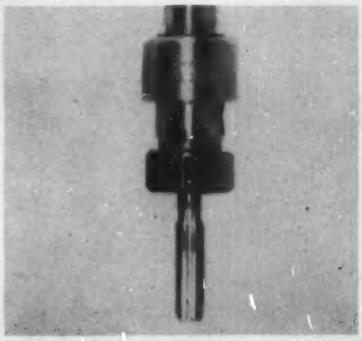
West Bend Equipment Corp, 335 Water St, West Bend, Wis

Hand-Grinder Speeds from 700 to 50,000 rpm

Ultra-Flex grinder is equipped with flexible grind shaft controlled by hand dial to shift spindle through full range of speeds. Power source is a 1-hp, 3-phase motor with V-belt pulley drive.

Carbide burs, mounted wheels, abrasive disks, buffing wheels and grinding wheels from 1/16 to 7-in. dia can be handled. High work quality and productive capacity is claimed because of accurate speed control and full utilization of correct speeds possible.

Metal Removal Co, 1546 N Orleans, Chicago 10, Ill

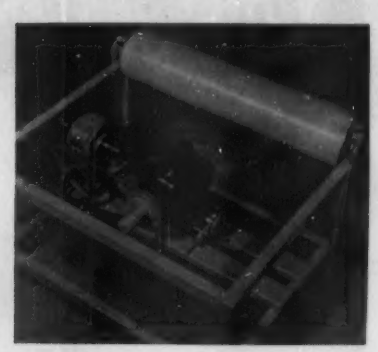


Ball-Action Tapping Chuck

Universal tap chuck is said to be easily convertible for releasing or non-releasing work and will tap right or left-hand when used on rotating or stationary applications. Tap holder has floating action and uses two rubber-flex pallets to fit all taps from No. 10 to ⅝ in. No bushings are needed.

Smooth releasing ball action is claimed to minimize tap chipping, improve thread quality, and maintain accurate thread depth. Tool is available with 5 different shank sizes, including Morse tapers. Improvements are convertible for releasing or non-releasing use and additions of Nos. 2 & 3 Morse taper shanks.

Roddick Tool Co, 1023 N Pauline St, Anaheim, Calif



Power Units

Add-A-Drive units convert idle gravity roller conveyors to powered belt or live roller units when material handling changes require traction for moving materials in horizontal, inclined, or declined planes.

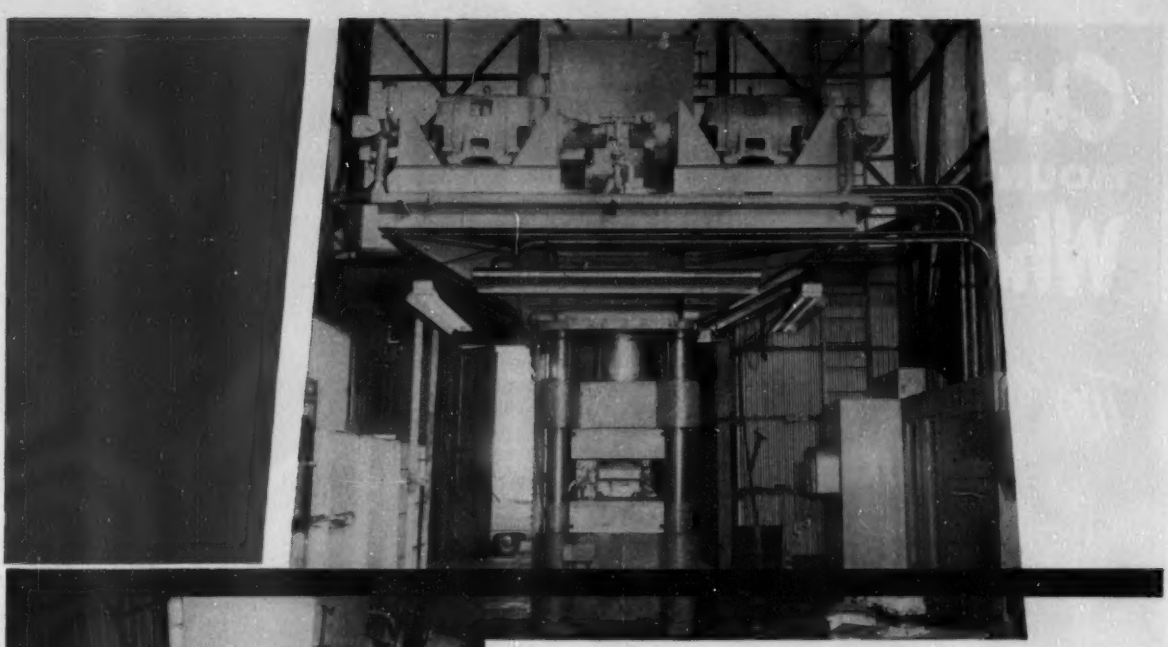
Units are powered with 1/3, ½ or ¾-hp motors for 110-volt or 220/440-volt, 60-cycle, three-phase current. Available from stock for belt widths of 8, 10, 12, 16, 24, and 30 in.

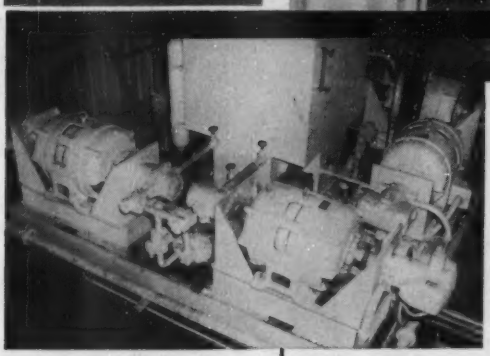
Sage Equipment Co, 30 Essex St, Buffalo 13, NY

Bench Type Center-Mike For Production Gaging

Bench-type center-mike measures center distances to 0.0005-in. tolerances regardless of hole sizes and does it in 10 sec, according to the manufacturer. It is reported ideal for production gaging of small, flat, and irregular metal components having center distances ranging from 0.040 to 12.4 in. Instrument gives half-thousandth center-to-center readings directly. Diameters from 0.030 in. upward can be measured. Unit is available in three standard sizes.

Sorensen Center-Mikes, Inc, 264 Kossuth St, Bridgeport, Conn





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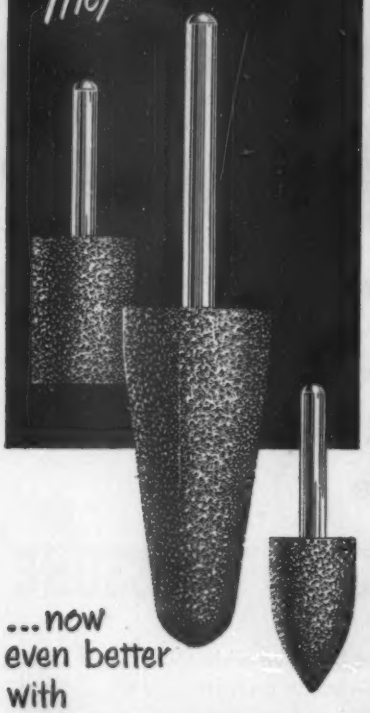

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Pocket measuring tape is ¾-in. wide, rather than usual ½ in., permitting user to measure longer distances without help. 10 ft long, one edge of the tape is graduated in 1/16ths, with first 6 in. graduated in 1/32nds. Other edge is graduated in ft, in., and ⅛ths, with small feet marks at each in. sign. Price, $2.39, including case, belt clip, and end-hook.

Evans & Co, Inc, 412 Trumbull St, Elizabeth, NJ

Plastic-face mallets are made in four hardnesses, each with a distinctive color, and four sizes. Plastic head is said to resist flaking and mushrooming, returning to original shape after each blow. Non-sparking, and, because handle does not project through head, all striking surfaces can be used. Catalog on request.

New Plastic Corp, 1043 N Orange Drive, Los Angeles, Calif

Pushbutton control allows operator to ride to top of lift on forks or platform, at increased lifting speed of 40 fpm, in "Timesaver" line. Built-in automatic trickle charger can be plugged to 110 v line (220 v if requested) for overnight charge, but no damage is done if left plugged in over a weekend. Turning radius of trucks is 33½ in.

Big Joe Manufacturing Co, 900 W Jackson Blvd, Chicago 7, Ill

Telescopic, battery-operated hydraulic lift truck has stacking height of 110 in. Designed for "in-between" handling problems, too heavy for manual handling, but not warranting expensive power-driven equipment.

Big Joe Manufacturing Co, 900 W Jackson Blvd, Chicago 7, Ill

Stud-driver designed to stand up under impact of power driving devices, for heavy-duty shop use, such as locomotive work, air compressor and engine builders, and the like. Takes studs from ¼ to 3 in. dia, with female driving squares from ½ to 1½ in. Morse taper and hex slip chucks available to adapt to drivers other than impact wrenches.

Titan Tool Co, Main St, Fairview (Erie County), Penna

Foot-operated models of Big Joe line have new working height of 80 in., to assist in handling ceiling-to-floor objects.

Big Joe Manufacturing Co, 900 W Jackson Blvd, Chicago 7, Ill

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Engineers and designers know they can depend on Curtis Joints — because catalogue torque and load ratings are substantiated by constant tests under actual working conditions.

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"For good tool life on our Acme Gridleys we use

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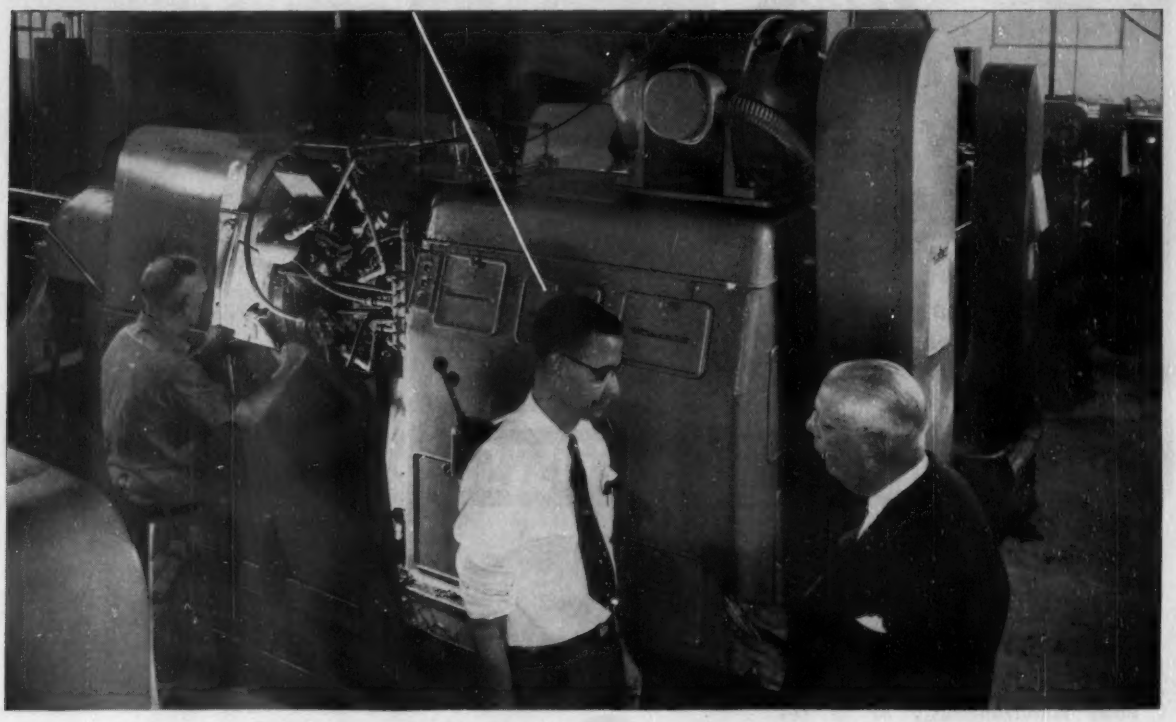
—It's an excellent cutting oil and lubricant"

says Mr. Paul Nippert, President, Nippert Electric Products Co., Columbus, Ohio



In machining special commutator nuts out of AISI 1018 and 1137 Steel, nine operations are performed on these 6-spindle Acme Gridleys. Tools are high-speed steel.

"We save time and money with Gulf Stainless Cutting Oil," says Mr. Nippert. "Using it as both cutting oil and lubricant, we avoid contamination and dilution problems, and we keep production at a high level. Then too, we have proved that it is noncorrosive to bronze machine parts."

This is one of scores of shops that have reduced machining costs through the use of Gulf Stainless Cutting Oil. For additional information, call in a Gulf Sales Engineer, or write for a free pamphlet on this outstanding product.

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1822 GULF BUILDING, PITTSBURGH, PA.

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More completely finished parts at the end of the day with no partly finished pieces lying around is the regular accomplishment of Goss & DeLeeuw "1-2-3" chuckers. It means complete finishing on one, two or three ends simultaneously or in sequence without tool resetting, rechucking or parts handling. Machining operations may include boring, facing, turning and threading.

Change over from job to job is simple. Cost-cutting is assured on long or short runs. Goss and DeLeeuw Chucking Machines are the only standard machines of their type which operate the "1-2-3" way to reduce costs per piece and step up the number of pieces per hour.

Investigate the opportunities offered by these machines on your production by sending samples of your work for time and cost estimates—Ask for illustrated descriptive literature.

GOSS and DeLEEUW
MACHINE COMPANY, KENSINGTON, CONN., U.S.A

Low-nitrogen steel welding electrode is said to lessen chance of "freezing" if electrode is held too close to work. All-State Monoweld No. 1 Special Electrode is said to be all-position, ac-dc rod for use on carbon, low alloy, and high strength steels, and other ferrous metals. Ts, 75,000 psi; yield, 65,000 psi; 27% elongation in 2 in. Various sizes, in 50-lb packages.

All-State Welding Alloys Co, Inc, White Plains, NY

CD Spray Mask A is a plastic putty developed to protect or mask off metal, plastic, and other surfaces during paint-spraying, cementing, flocking, and similar operations. Can also be used for making jigs and fixtures for holding parts during cementing and machining, for low-pressure forming dies, and for making molds for a large number of models. Product hardens to an extremely strong, tough, rigid solid one to two hours after addition of a catalyst or hardening agent. No heat or pressure is required.

Chemical Development Corp, Danvers, Mass

Free-machining high-carbon-high-chromium die steels of D-2 cold-work type are being produced. According to manufacturer, as much as 50% of machining time saved, compared to previous D-2 steels. Olympic FM steels.

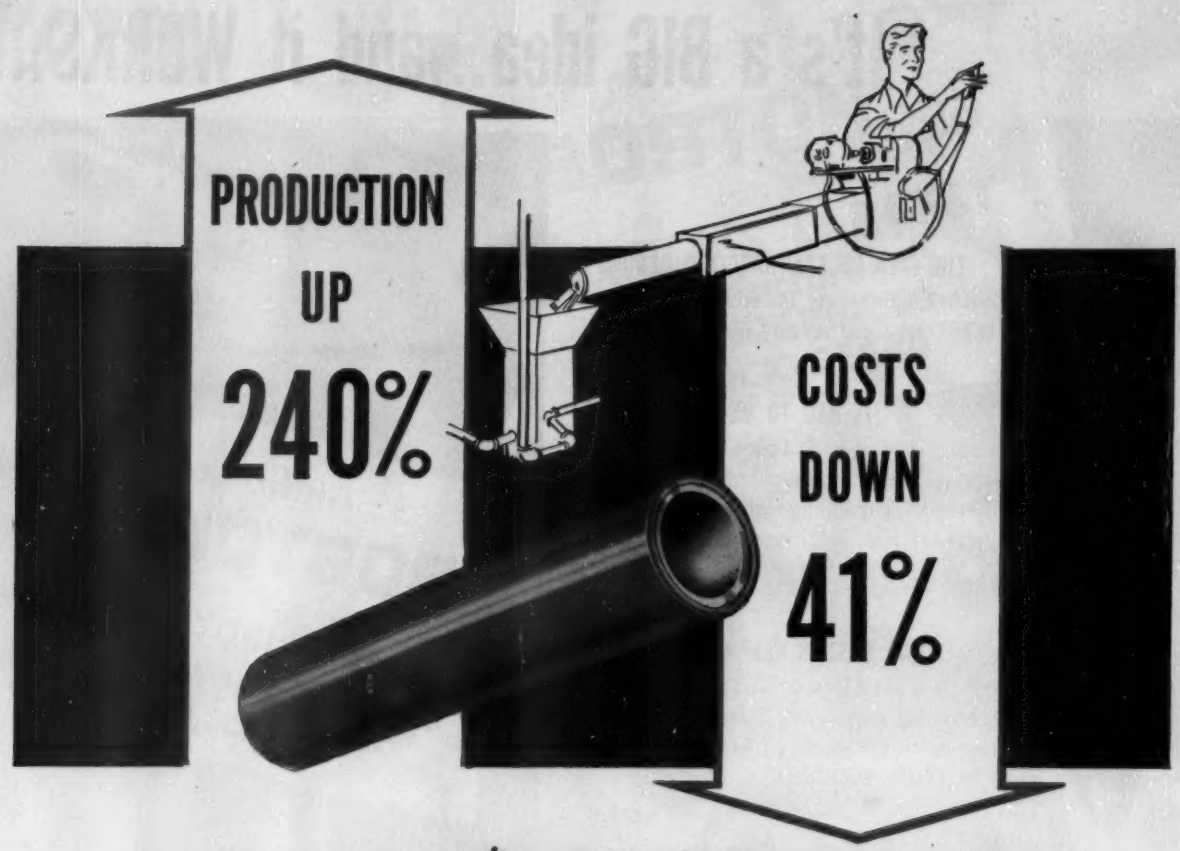
Latrobe Steel Co, Latrobe, Penna

Electronic power supply for Calidyne Shakers. Power input is rated 20 amp at 110 v ac; amplifier output is 400 watts. Output rating of field supply is 8½ amps at 115 v dc. Permits user to start with one basic power supply and shaker unit. If needs increase, shaker units are added, without adding power supply for each new unit.

Calidyne Co, Winchester, Mass

Econostrip has been developed for removing paint, lacquer, enamel, and hard-to-strip finishes from a variety of metals. Epon finishes, for instance, pop up in 20 seconds, stripped paint can be flushed off with water, leaving surface clean and, when dried, ready for repainting. Product does not remove the bonderize or phosphate coating, and will not attack metals. Reduces with water up to equal parts for use.

Beck Equipment Co, 3350 West 137th St, Cleveland 11, Ohio



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Whether you're interested in upping production or downing costs—or both—it pays to investigate TOCCO Induction Heating if you heat-treat, anneal, braze, solder, forge or melt ferrous or non-ferrous metal parts.

PRODUCTION UP—When Thompson Products Ltd., St. Catharines, Ontario switched from conventional methods to TOCCO Induction Hardening of their automotive wrist pins, production rose from 500 to 1200 per hour.

COSTS DOWN—While production jumped, costs fell from $5.46 per hundred parts to $3.23—a savings of more than 2c per pin or $26.76 per hour on the hardening operation alone.

OTHER ADVANTAGES—Additional savings result from elimination of hauling wrist pins to and from the heat-treat department. Cool, clean TOCCO fits right in the production line, next to related operations—takes only ¼ the space of the pusher-type furnace previously used.

In Canada or the United States TOCCO engineers are glad to survey your operations for similar cost-cutting results—no obligation, of course.

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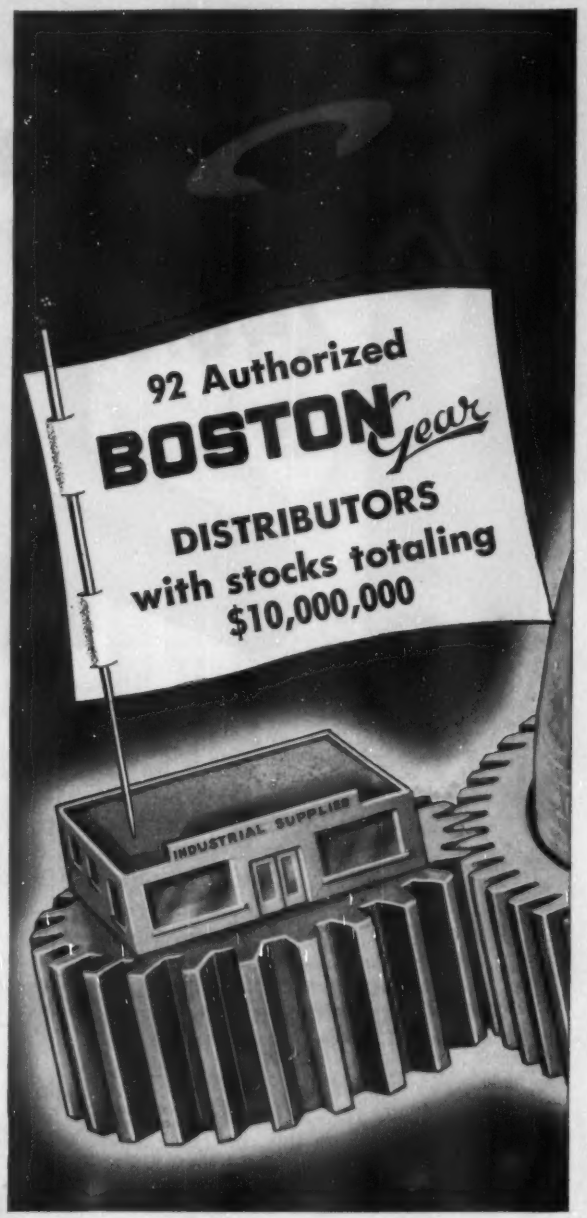

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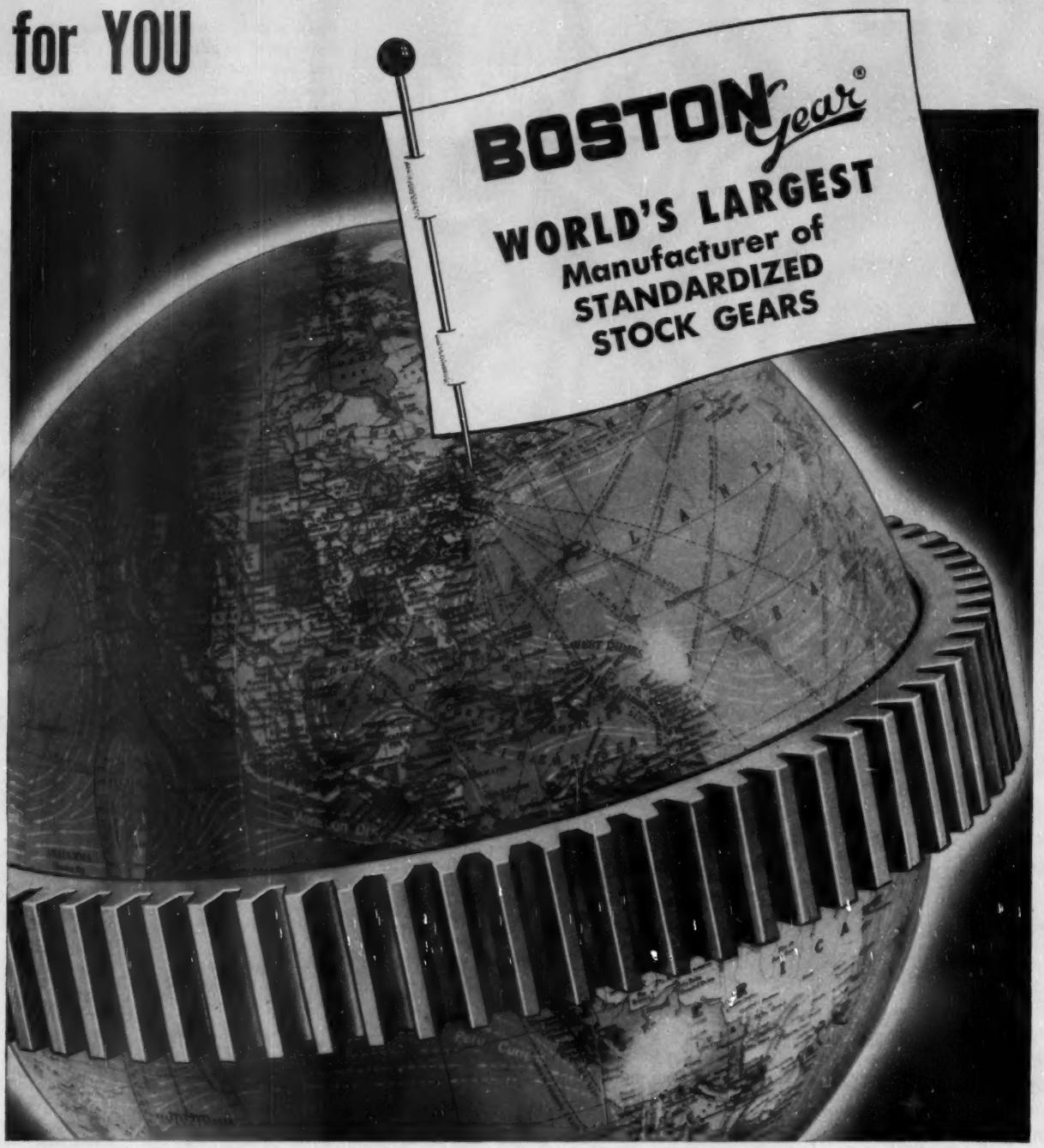
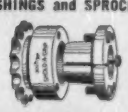


SHOLD-A-GRIP Interchangeable Tapered BUSHINGS and SPROCKETS



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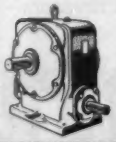
REDUCTORS



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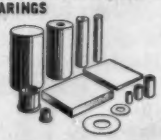

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Vinco Corp., 9125 Schaefer Hwy., Detroit 28, Mich.

Metal Component Parts Mass Produced • Aircraft and Commercial Gears • Model B-1 Dresser • Precisiondex • Spline Gages Master Gears • Gear Rolling Inspection Fixtures • Camshaft Comparators • Optical Master Inspection Dividing Heads • Involute Checker. ®

VINCO

MILLIONTHS OF AN INCH FOR SALE

TRADEMARK OF DEPENDABILITY

Open end-box wrenches have been redesigned to slimmer heads, longer and narrower handles. Sizes from ¼ in. to 1⅝ in.

J H Williams & Co, 400 Vulcan St, Buffalo 7, NY

Flameproof, all cotton, disposable towel has been developed to replace cloth wipers. Towel, said to reduce wiper costs as much as 50%, absorbs six times its own weight in grease, oil, or water; may be used wet or dry for wiping, cleaning, polishing. Price, 1½¢ in colors, 2¼¢ in white. Size is 12 x 18 in.; can be cut to specifications.

Leshner Corp, Hamilton, Ohio

Flexentrik oscillator, for use in grinding, polishing, and sanding, when interposed between power unit and abrading head, acts as a free-floating coupler, permitting full face contact of abrasive disk or polisher. Heat-resisting rubber device prolongs life of power tools by cushioning shock to motor bearings, is said to eliminate torque, jerking, scoring, and grabbing, as well as clogging of abrasive. Manufactured in sizes to fit all popular motor shaft threads; available in two types, general service, and light duty.

Flexentrik Corp, 555 Fourth St, San Francisco, Calif

Hinged bar clamps can be mounted on any flat surface, positioned either in working position or out of the way, to be swung into place. Four designs available, with reach of 2 to 5 in., with opening capacity of 6 to 30 in. Details from Dept M-417.

Adjustable Clamp Co, N Ashland Ave, Chicago 22, Ill

"Non-flam" safety package group of processing products has been assembled for use in vicinity of fire and intense heat. Includes a rust-preventive with high flash point, a water solution for cleaning designed to replace low-flash point solvents, and water-soluble cutting base. Literature available.

E F Houghton & Co, 303 W Lehigh Ave, Philadelphia 33, Pa

Fluted-socket setscrews require special wrench, lessening chance of tampering. Both Zip-Grip and conventional types available with fluted sockets. Literature on request.

Set Screw Manufacturing Co, 13 Main St, Bartlett, Ill

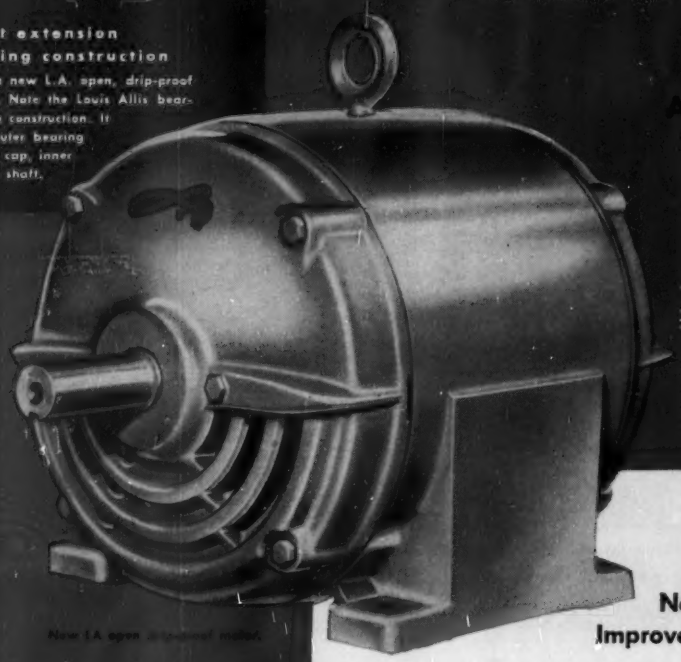
Here's another reason why

the NEW L.A. *Line*

by the Louis Allis Co.

is your BEST *electric motor* BUY

Shaft extension bearing construction used in new L.A. open, drip-proof motors. Note the Louis Allis bearing-cap construction. It locks outer bearing race to cap, inner race to shaft.



New LA open drip-proof motor

A brand-new power package, completely redesigned inside and out

with NEW BEARING CONSTRUCTION

plus

New modern styling
More compact design
New conduit box arrangement
Improved ventilation and better protection
More versatile mounting

HERE'S the locked bearing construction that makes the new L.A. motors even better—gives them extra life, extra dependability. It positions the rotor . . . limits shaft end-play . . . gives you ample V-belt drive capacity. You get factory prelubrication, too, with a new, improved grease-retaining system that saves servicing and maintenance — for years of attention-free operation under most conditions.

That's not all! You get standard bearings in every unit — sizes specially selected to be easily obtainable from local stocks. And there's no need to tear the motor down to get bearing numbers — they're stamped right on the new motor nameplate.

Add this modern, dependable bearing construction to all the other features and you see why the L.A. line is your best motor buy. Get the complete story from your nearby Louis Allis Sales Engineer.

We specialize in SPECIAL MOTORS *and* PROMPT DELIVERY, TOO

There's a Louis Allis special motor for your toughest application. Whatever electrical or mechanical modifications you need, check first with Louis Allis.

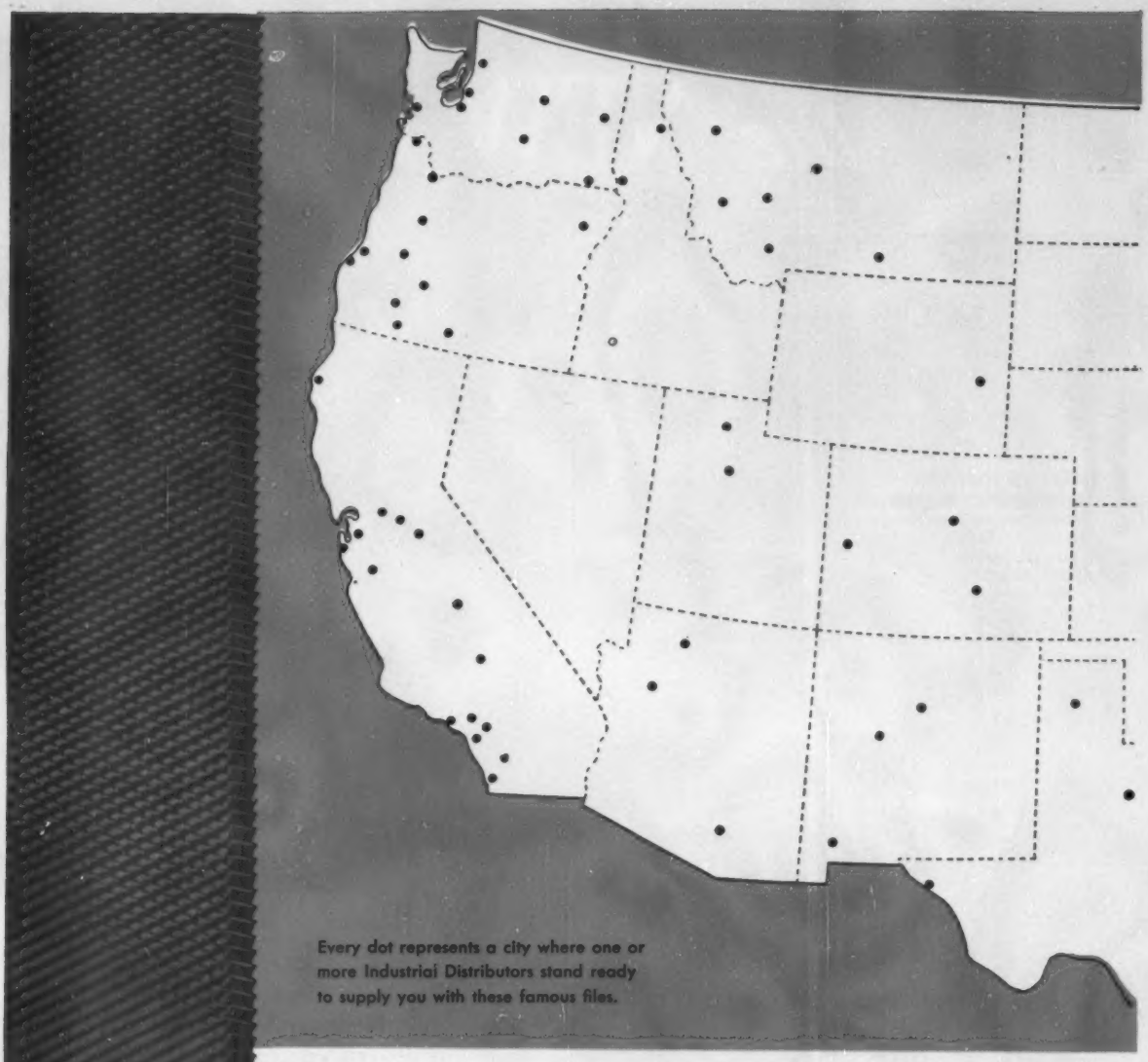
Vertical NEMA C-flange motor

NEMA D-flange motor

NEMA C flange motor

THE LOUIS ALLIS CO.
MILWAUKEE 7, WISCONSIN

LA-106


Every dot represents a city where one or more Industrial Distributors stand ready to supply you with these famous files.

A DISTRIBUTION SERVICE

Nicholson and Black Diamond files are handled by one of the largest and most widespread groups of Industrial Distributors serving American industry.

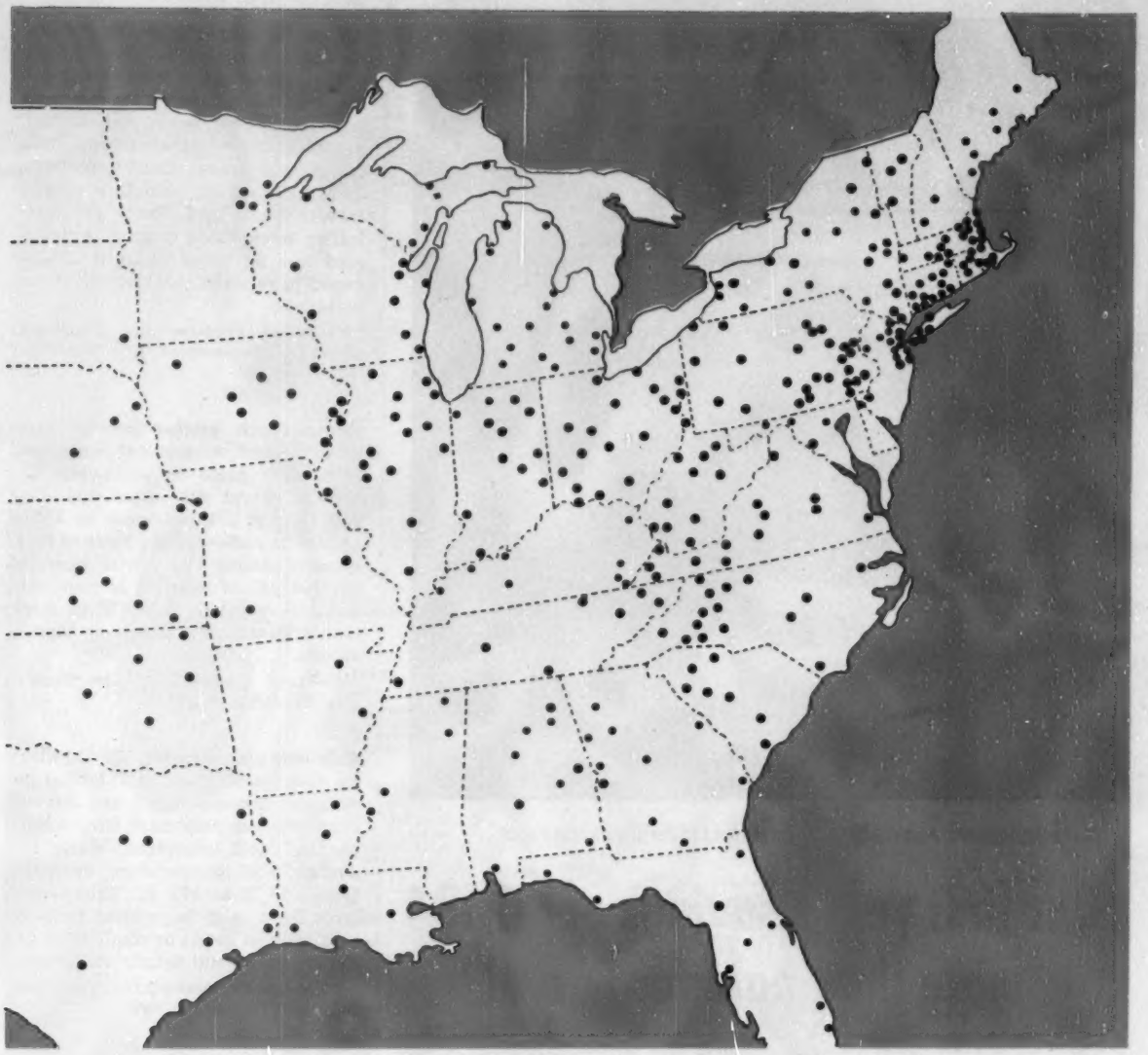
They can serve you no matter where you are located.

To you managing, purchasing and production heads, Nicholson and Black Diamond distribution is measured in terms of *Availability*, *Knowledge* and *Facilities:*

1. There are Nicholson and Black Diamond distributors in the 396 cities indicated above—a complete network.

2. They are all high-type distributors with well-trained, competent salesmen.

NICHOLSON



THAT COVERS THE NATION

Thus the Nicholson and Black Diamond distributor representative serving you is a useful technical consultant instead of just an order taker.

3. They have the means for maintaining good stock assortments.

4. They have efficient delivery facilities.

5. They rate high in intimate knowledge of the file requirements for different industries, different metals, different shop operations.

Nicholson products include every practical shape, cut and size in Regular Purpose, Special Purpose, Saw, Milled Curved Tooth, Swiss Pattern and Rotary files—the largest aggregate in existence.

NICHOLSON FILE COMPANY

PROVIDENCE 1, R.I.

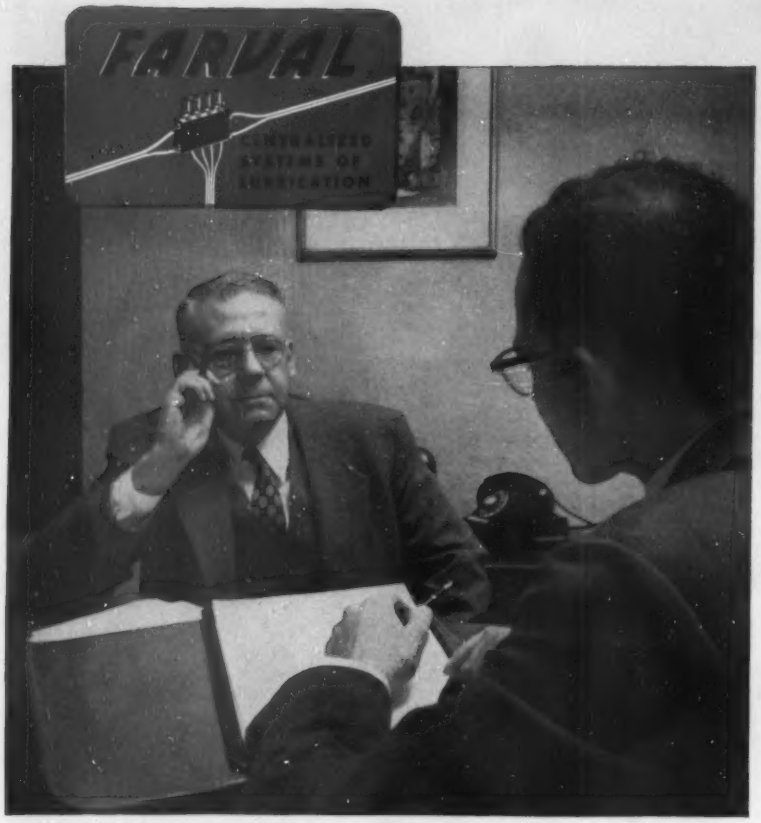
(In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ontario)

NICHOLSON U.S.A.

BLACK DIAMOND MADE IN U.S.A.

...A FILE FOR EVERY PURPOSE

A DISTRIBUTOR FOR EVERY USER



PRESIDENT REPORTS ON CENTRALIZED LUBRICATION

"Our first year's savings of $41,184 more than paid for Farval"

ONCE a day, every day of the week, 133 presses in a midwestern metal-working plant were stopped for oiling. It took all of 11 men's time to do the job. Sometimes certain bearings were missed. So, shutdowns for bearing repairs and parts replacement were frequent and *expensive.*

Then management learned of Farval Centralized Lubrication. They invested in 133 Farval systems for their presses. Results were immediate and startling! Not a single shutdown for oiling! Not a single shutdown for repairs! Not a single shutdown for replacement of parts due to inadequate lubrication. Farval eliminated the "human element" and saved $41,184 the first year in man hours alone. In addition, there was a 75% savings in lubricant and hundreds of production hours have been saved. *All this in just one year!* With comparable savings reported *each year,* no wonder this company is so overwhelmingly in favor of centralized lubrication!

FARVAL is the foolproof Dualine system of centralized lubrication that delivers a measured amount of clean lubricant at regular intervals to every bearing. From a central station, lubricant is pumped under pressure to a measuring valve at each bearing, delivering the exact amount of lubricant required.

FREE LUBRICATION SURVEY—Let us send one of our lubrication engineers to inspect your plant equipment. Without obligation, he will present a written analysis of what Farval can do for you. Write also for Bulletin 26 for the complete Farval story.

The Farval Corporation

3254 EAST 80th STREET • CLEVELAND 4, OHIO

Farval is an affiliate of The Cleveland Worm & Gear Co. Represented in Canada by Peacock Brothers, Limited

Automatic magnet-carrying system has been designed to pick up and move one carload of metal chips and shavings daily. Scrap from machines on the first floor is emptied through chutes into two parallel tunnels in the ground below. Each tunnel has its own track on which a carrier travels back and forth automatically; scrap from tunnels is delivered to a bin from where it is conveyed to railroad cars outside of the building.

Cleveland Tramrail Div, Cleveland Crane & Engineering Co, Wickliffe, Ohio

Electro-Black plating process provides for fast, economical deposition of a black plate on practically all metals, except aluminum. On die-cast metals, a thin copper or brass undercoat suffices. Only three to four minutes plating at 1 v with 10 amps per 100 gal. of solution is required. Bath is operated at 150 F in steel tank and utilizes stainless or copper anodes.

Enequist Chemical Co, 100 Varick Ave, Brooklyn 37, NY

Extruded plastic sealer, No. 155 Elastic Compound Tape is intended to seal metal seams, glass and rubber channels; has resin base with asbestos and inert extenders. Water resistant, and temperature resistant from -50 F to 375 F. Thicknesses from 0.004 to ¼ in., widths from ⅜ to 2 in., and beads as small as ⅛-in. dia. Samples and details on request.

Presstite Engineering Co, 3798 Chouteau Ave, St Louis 10, Mo

Panalarm visual sequence annunciators are particularly useful where alarms are applied to closely interrelated variables. Sequence-indicating annunciators pinpoint cause of trouble by showing first variable to go "off-normal," accomplished either by automatic lockout of subsequent signals, or by causing first to be red and subsequent signals white. System is suitable for Class I, Division 2 locations; available in standard backlighted nameplate cabinets providing from 3 to 48 signals.

Panalarm Products, Inc, 6312 N Broadway, Chicago 40, Ill

Screwdrivers with round, square, clutch, Phillips, screw-holding, and radio blades. Tempered chrome-vanadium steel blades; non-flammable, knurled plastic handles. Hand-tool catalog on request.

Blackhawk Mfg Co, Milwaukee 46, Wis

Time to Reduce Milling Costs!

PRODUCTION UP!
COSTS DOWN!
No. 1-8
8" table travel... 25" x 9" table... automatic hydraulic table feed.
No. 2-20DS
Double Spindle for two milling operations at same time... 20" table travel ... 42" x 12" table.
No. 2-20
20" table travel... 42" x 12" table.. fully automatic hydraulic table feed.
No. 1-14DS
Double Spindle for two milling operations at same time ... 14" table travel ... 32" x 9" table.
No. 1-14
32" x 9" table ... 14" table travel ... hydraulic table feed ... full automatic cycle.
No. 1-V
Hydraulic vertical head feed ... 5½" head travel ... 25" x 9" table.
No. 2-20V
20" table travel... vertical spindle with speed range 32 to 1284 R.P.M. ... 42" x 12" table.
No. 1-M
Hand feed to table and head ...25" x 9" table ... Adjustable head counterbalance.

KENT-OWENS REPRESENTATIVES

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TORONTO, ONT.
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WINDSOR, ONT.
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Kent-Owens machines assure you of speed with accuracy ... and cut your milling costs! Designed with advanced features ... performance-proved for meeting tough schedules in production milling. Rugged ... simple ... versatile. Twin-post head mounting assures balanced load. Greater cutting efficiency—only two gear contacts, motor to cutter. Write for bulletins on wide range of hydraulic and hand-operated machines. Also, let Kent-Owens design and build your tooling and special machines. Kent-Owens Machine Co., Toledo, Ohio.

Call on

KENT-OWENS

for Milling Machines

It Pays to Know Your KENDEX* Tooling

There are no substitutes for Kendex inserts. Only Kennametal Inc. makes them—and they're made only of Kennametal.

Kendex inserts are round, square, or triangular tool blanks having multiple, precision-ground cutting edges; designed for screw-mounting to enable fast, accurate indexing without resetting the tool. When all cutting edges of a Kendex insert have been used, the insert is thrown away—*no resharpening.*

You can obtain these advantages with Kendex tooling: (1) Minimize downtime for tool changing; (2) Eliminate tool grinding expense; (3) Prevent temptation to "save" money by reconditioning tools that have outlived their usefulness. Ask your nearest Kennametal representative for details. Kennametal Inc., Latrobe, Pa.

HOW KENDEX* WORKS

1 Hard, strong, wear-resistant Kennametal is molded into square, round, or triangular Kendex inserts, which are precision ground.

2 Kendex inserts are mounted to suitable tool holders with socket head screws.

3 When edge becomes dull, insert is turned to new cutting position. When all cutting edges have been used, insert is thrown away; no regrinding.

*Registered Trade-Marks

KENNAMETAL*

CEMENTED CARBIDE TOOLING
THAT INCREASES PRODUCTIVITY

SALES OFFICES IN PRINCIPAL CITIES

A-6

Recova remote control deadman valve for all types of sandblast machines provides instant control of blasting at nozzle head, is said to reduce manpower and material costs by 20-40%, and insure complete on-the-job safety. Cuts labor costs by eliminating need for pot tender on small jobs, reduces loss of material with instant shut-off control. Unit can be installed in fifteen minutes with no electrical connections, operates with equal effectiveness on all abrasives.

Clementina, Ltd, 2277 Jerrold Ave, San Francisco, Calif

Turco-Solv quick-drying safety solvent has been developed for cleaning electrical equipment where a high-flash material is required. Can be used on production lines and in whirl parts washers as a substitute for vapor degreasing or handwiping. It is non-corrosive and leaves no residue; non-conductivity permits use on motors while they are hot; applied by non-atomizing low-pressure spray or brush.

Turco Products, 6135 S Central Ave, Los Angeles 1, Calif

Manual starting and overload switch for fractional hp motors was developed for washing machines, lawn mowers, and similar jobs. Totally enclosed. Overload protection through nichrome heater and Ni-alloy bimetal strip in tripping mechanism. Size, 2⅞ x 1 1/16 x 1 3/16 in. Two mounting holes, to accommodate No. 6 self-tapping screws.

General Electric Co, Schenectady, NY

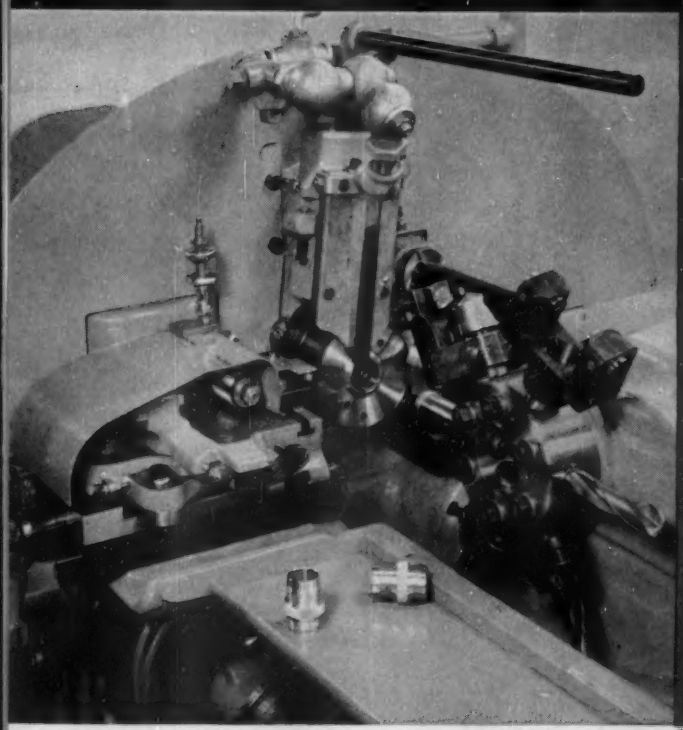
Duplex controller regulates both temperature and concentration of blackening-bath solutions. Foxboro Duplex Temperature Controller opens or closes water valve, raising or lowering to correct value of boiling point, giving corresponding concentration of chemical. Also, on start-ups or during production peaks, the instrument controls fuel valve, permitting more heat without overflow or waste.

Foxboro Co, Foxboro, Mass

Vitrified-bond grinding wheel is designed for abrasive-resistant materials. Said to cut high carbon-vanadium-cobalt steel ¼ in. deep and ½ in. wide in 2 min, 0.005 to 0.010 in. per pass, at 3500 rpm. 7-in. dia, aluminum oxide abrasive.

Electro Refractories and Abrasives Corp, 344 Delaware Ave. Buffalo 2, NY

Up Goes Output...



Down Go Costs

when you use

REYNOLDS ALUMINUM SCREW MACHINE STOCK

Aluminum alloys are excellent for screw machine work because, job for job, they machine at greater speeds and feeds—with standard tools, or with slight modifications for the higher speeds. That means a *step up* in production, and it's easy to see how your unit costs for material, handling and shipping *step down* with strong, lightweight aluminum that gives you three times the number of pieces per pound. Rust-free aluminum often requires no finishing but, when needed, takes most of the regular metal finishes . . . also permits a wide choice of attractive anodized finishes in natural tones and sparkling colors.

For prompt delivery on aluminum screw machine stock plus design and fabrication engineering service when you need it, call your nearby Reynolds Office or distributor listed under "Aluminum" in your classified telephone directory. They'll also show you how you can increase your sales and save your customers money if you submit alternate quotations based on aluminum when other materials are specified. For more complete information write on business letterhead for your free copy of the 124 page handbook, "Machining Aluminum Alloys," and index of Reynolds Literature. Reynolds Metals Company, 2523 South Third Street, Louisville 1, Kentucky.

SCREW MACHINE ALLOYS

11S-T3—Free machining. Fine finishes at high speed. Free cutting, fine chips, good strength. Excellent for screw machine work. Longer tool life but slightly less strength than 17S-T4. Good formability of machined parts.

17S-T4—Excellent finishes. Fine for general purpose machining. Good corrosion resistance and strength.

SPECIAL MACHINING ALLOYS

24S-T4—For simple machine work. Chips long and curled. Stronger than preceding alloys. Smooth finishes.

61S-T6—Good corrosion resistance, weldability, strength. Lower machinability. Best formability and suited to electro-chemical finishes.

2S and 52S—Higher purity aluminum alloys available for special applications. Have good formability.

REYNOLDS ALUMINUM

MODERN DESIGN USES ALUMINUM IN MIND • More Information on Next Page

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Southern States Iron Roofing Co., Birmingham
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OHIO
The Atlas Metal Co., (Ingot only) Cleveland
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VIRGINIA
Southern States Iron Roofing Co., Richmond
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WISCONSIN
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Look Under "Aluminum" in Your Classified Telephone Directory

Rely on Your Nearby REYNOLDS ALUMINUM Distributor for

Extra Equipment That Lowers Costs

- **No capital tie-up in equipment**
- **Release needed floor space**
- **Eliminate additional operations**
- **Reduce metal waste**
- **Save shop time and labor**

Slitting, cutting, shearing, sawing and other specialized operations are money-saving services we offer.

Let us show you how our distributor services and equipment can eliminate some of your problems, and, at the same time, save you money.

PLUS THESE ADVANTAGES

PROMPT SERVICE AND DELIVERY

You get fast delivery on both your "rush" orders and regular shipments. This helps you keep production on schedule... eliminates costly delays waiting for mill shipments.

CONVENIENT WAREHOUSE STOCKS

We can help you eliminate capital tie-up in obsolete or idle inventory . . . this means that you can cut your stock record keeping, accounting cost and warehouse overhead.

YOUR PARTNER IN PRODUCTION

Whenever we can, we will help on your production problems. Reynolds technical service men in the field and the fully integrated staff at Reynolds home office work hand in hand with us.

Call us today for Reynolds Distributor Service. *We're as near as your phone.*

REYNOLDS ALUMINUM

MODERN DESIGN HAS ALUMINUM IN MIND

Long motion vertical motor base provides 6-in. vertical adjustment. Base, which saves floor and machine space, provides amount of adjustment required where driving wheels that operate with endless belts or chains are changed. Vertical motion is great enough for use with spring-loaded type of variable speed motor pulley. Unit accommodates electric motor frame 284, 7½ hp at 1800 rpm 5 hp at 1200 rpm, or 3 hp at 900 rpm.

Quintin Kearney, 220 Congress Ave, Lansdowne, Pa

Perspective graphs for scaling directly from engineering drawings into distortion-free perspective views are available in a 20 x 33-in. size, in addition to the original 30 x 60-in. size. Each of the seven basic graphs may be used as a top or bottom view. Price of set, $15, individual graphs, $3.

Tech-Art Graphs, 315 South 15 St, Philadelphia 2, Pa

Xyron electrode, with specially designed coating, is available for welding cast iron. The 3/32-in. electrode operates on 35 to 75 amps. Can be used for building up, repairing breaks or cracks, fabricating; deposits are said to have maximum machinability. All-position welding is possible.

Eutectic Welding Alloys Corp, 40-40 172 St, Flushing 58, NY

Toggle clamps, of more than 35 sizes, have hardened steel bushings at wear points. Rated capacities from 80 to 1600 lb.

West Point Mfg Co, 26935 W 7 Mile Rd, Detroit 19, Mich

Swivel shoes and screws are available in 4 types and 63 sizes. Literature on request.

West Point Mfg Co, 26935 W 7 Mile Rd, Detroit 7, Mich

Electric soldering iron for use on fast production lines is plug-tip design, rated at 100 w, but with a ¼-in. tip instead of the conventional ⅜-in. dia. Reaches and maintains a temperature considerably beyond that of the 100-w, ⅜-in. iron, and large reservoir of heat speeds operation. Because less copper is used, 50% saving is realized in tip replacement cost. Model No. P-114 is priced at $8.25.

Hexacon Electric Co, 135 W Clay Ave, Roselle Park, NJ

This Mark means Longer Life... Greater Accuracy

Wendt-Sonis is one of the oldest exclusive manufacturers of carbide cutting tools. Today as always, W-S tools are made of the finest materials by skilled craftsmen.

Production tests in many plants prove that W-S materials and workmanship mean longer *tool life* and *greater accuracy.*

Write for this 84-page catalog giving complete details and applications of all W-S tools, blanks and inserts.

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1881 CAPEWELL

BAND SAW BLADES

Wherever Capewell Metal Cutting Band Saw Blades have been used they do their own selling. These keen-cutting, long-lasting bands tell their story quickly in the shop. They are available for contour or profile sawing machines, for horizontal and vertical cut-off machines . . . and in a range of tooth pitches suitable to cover the requirements of any job. Write for catalog specification sheets 1126 and 1126-1 for full description, and for Capewell's "How to Use" book.

Ask your distributor

THE CAPEWELL MANUFACTURING CO.
65 GOVERNOR ST. • HARTFORD 2, CONNECTICUT

4CA34

Kerpro VPI is available in a pressurized can. Non-flammable, nontoxic product provides long term protection against rust in containers with closures; eliminates need for using oils and greases during interim storage, as well as need for degreasing. Can be used on all ferrous metals and on any type of part from forgings to machined surfaces.

Protective Coatings Corp, Park Ridge, Ill

Emulsion cleaners for spray-on cleaning of grease and oils. To be added in small amounts to petroleum solvents, said to increase the penetrating power of the solvents. Seven products, for various requirements. Bulletin A-106, and other literature, including technical data, on request.

Turco Products, Inc, 6135 S Central Ave, Los Angeles 1, Calif

Clamp components added to Siewek line of jigs, clamps, and fixture details. Added parts include keys, spring plungers, spring stops, torque screws, and other items, all of alloy steel. Engineering data on request.

Siewek Tool Co, 2862 E Grand Blvd, Detroit 2, Mich

Empco style JD machine leveling jacks incorporates various improvements over the company's former wedge design jacks. In addition to greater strength, changes allow greater compensation for any floor unevenness. Hexagon head of adjusting screw has been increased in size for easier wrench grip. Style JD-1 is for light to medium weight equipment; JD-2 for medium heavy; JD-3 for heavy duty.

Enterprise Machine Parts Corp, 2731 Jerome Ave, Detroit 12, Mich

All-metal cabinet for small items is available in a 32-drawer and a 16-drawer model. Dividers are provided to separate rustproof aluminum drawers into three compartments if desired. The 1¼ x 2¾ x 5⅞-in. drawers have recessed front panel for labeling, and a tab handle. Price of larger unit, $9.95; smaller, $5.95.

Perkins Products, Inc, 170 E Market St, Alliance, Ohio

Steel forging stamps, style FR, have 45° rounded bevel on stamp, to prevent metal being caught in markings. Stock sizes from 1/16 to ½ in. Other sizes to order. Information on request.

M E Cunningham Co, 1062 Chateau St, Pittsburgh 33, Penna

Power! Control!! Production!!!

with Schrader Valves

Compressed air, plus automatic control, has given industry a muscle-saving power to produce more economically . . . without fatigue . . . with increased production.

Reliable valves are an absolute necessity. And **Schrader Valves** are the accepted solution, wherever air controls are used. Schrader Valves are designed and built by a company whose success dates back to 1844—more than a century of experience in air control.

In the complete line of Schrader Valves you'll find two-, three- and four-way models . . . for hand, foot, tripper, cam, pilot or solenoid operation . . . for practically any application.

Compressed air has become a *must* in every plant. If you are not now using it, *investigate* it. And—wherever you actually use compressed air—you'll make its use most effective if you use the best valves possible—Schrader Valves.

Find out how you, too, can put compressed air to work to save you money. For details, write—or, if you prefer, fill out the coupon below.

Schrader

REG. U. S. PAT. OFF.

Leaders in air control since 1844

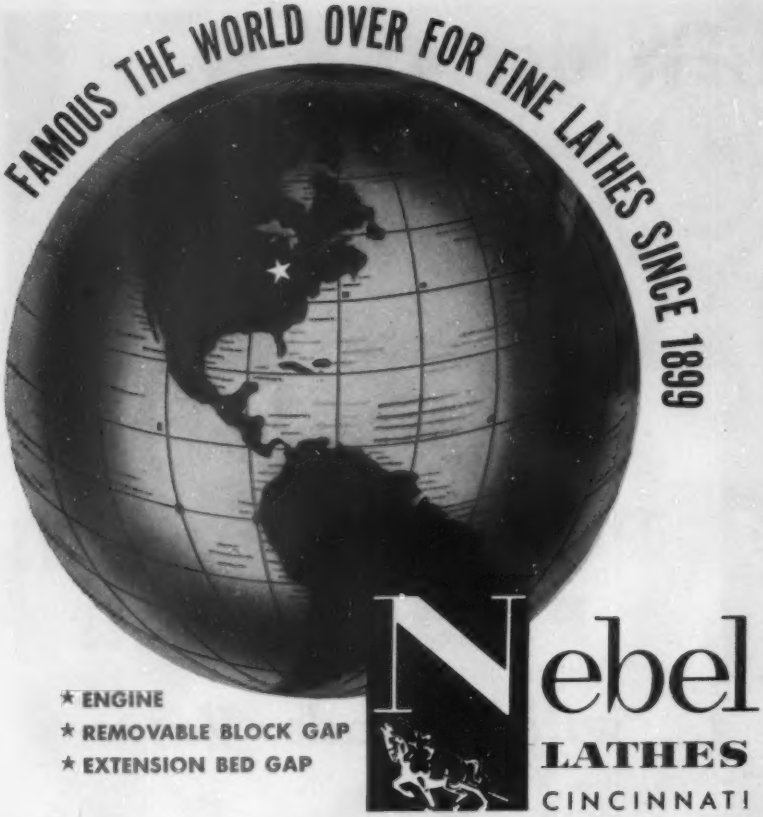
A. Schrader's Son
Division of Scovill Manufacturing Company, Incorporated
460 Vanderbilt Avenue, Brooklyn 38, N. Y., Dept. F-4

I am interested in more information on _____.

Name _____ Title _____

Company _____

Address _____



BETTER PERFORMANCE
thru BETTER DESIGN
ON YOUR
RUTHMAN
GUSHER
COOLANT
PUMPS
Illustrated is an Abbey Etna Swaging Machine, Series #154, equipped with a Ruthman Gusher Coolant Pump
All Gusher Coolant Pumps are designed to give you better performance. You get split-second control of coolant flow from the instant the machine is turned on.
Pre-lubricated heavy-duty ball bearings require no further lubrication. There is no packing or priming necessary. The electronically balanced rotating assembly reduces vibration and lengthens the life of your Gusher Coolant Pump. Always specify Gusher Coolant Pumps. Write for catalog.
THE RUTHMAN MACHINERY CO.
1818 Reading Road, Cincinnati, Ohio

Portable equipment chest carries complete KSM stud-welding unit, together with work orders and other records. Welded construction, with handles at each end. Size 36½ x 15 x 17 in. Full-length piano hinge and two padlock-locking hasp hinges. Data on request.

KSM Products, Inc, Merchantville, NJ

Plastic wheel for general shop handling equipment has 2000-lb capacity, and is said to be floor-protective, noiseless, non-sparking, and shock-absorbent. Roller bearings, with Zerk lubrication fittings. Sizes from 4 to 12 in. Catalog information on request.

Hamilton Caster & Mfg Co, 1700 Dixie Highway, Hamilton, Ohio

Cleaning cloths treated with special solution which remains "tacky" are designed for cleaning surfaces to be painted. It is claimed that the treatment with solution enables cloth to pick up small particles from surface, giving a good paint base.

Associated Producers, Inc, 1019 E Eight Mile Rd, Hazel Park, Mich

Chain couplings to take Browning Malleable Split Taper Compression Bushings are available in range of sizes and capacities to 150 hp. Couplings are composed of American Standard sprockets with hardened teeth, and give wide bore selection for each size. Bulletin—form 2017.

Browning Manufacturing Co, Mayville, Ky

Toolcraft has added a 12-in. model Ajusto profile templet to its line. Instrument is composed of brass strips 0.010 in. thick. Both male and female profile are obtained in a matter of seconds of objects 12 in. long and 4-in. depth of contour. Additional adjustment and locking force has been incorporated by using a right- and left-hand threaded member to apply pressure on both ends at once. Price, $69.50.

Toolcraft Mfg Co, PO Box 507, East Chicago, Ind

Insulating cement, Atox, is said to bond to any clean, dry surface, with rated gripping power of 41.7 psi. Type "C" is for applications from 0 to 212 F; type "B" for higher temperatures. Non-shrinking, powder form, to which water is added to make ready mixture.

Kragor Corp, 884 N Graham St, Allentown, Penna

Here's a NEW design feature in Vertical Mills!

VERTICALLY ADJUSTED HEAD GIVES GREATER RIGIDITY AND ACCURACY

Here are the facts . . .

Unlike knee-type mills, the head of the IMPCo Model 1-B Vertical Milling Machine is vertically adjusted by a counter-balanced ram. The table and controls do NOT move vertically. The exclusive ram design has greater rigidity. Its larger scraped bearing surface area gives more accuracy for both production and tool room milling.

Massive Design for *Versatility* and *Precision*

The IMPCo Model 1-B is heavy for a No. 1 Mill. It weighs approximately 3,100 lbs. Spindle quill diameter is 3½". Uses *standard* 1 HP motor.

Get all the facts.
Write for Bulletin AM-102.

IMPCO

INDUSTRIAL METAL PRODUCTS CORPORATION

Builders of IMPCo Straighteners, the American HEB Pilot Lathe, and Special Machinery

3400 W. ST. JOSEPH STREET LANSING, MICHIGAN

Raytheon Mfg. Co.
Goodyear Tire & Rubber Co.
Telechron Dept., G. E.
Chicago Pneumatic Tool Co.
Chain Belt Co.
Sylvania Electric Products, Inc.
Republic Aviation Corp.

They All Use
UNISORB®
MOUNTING
To reduce vibration & noise 60% to 85%

WHEN YOU MOUNT PRODUCTION MACHINES ON UNISORB PADS OF THE PROPER THICKNESS AND DENSITY YOU —

- REDUCE vibration and noise 60% to 85%
- INCREASE machine life
- IMPROVE working conditions
- MAINTAIN quality in production

And you do it without drilling floors, because you mount machines without bolts or lag screws when you use UNISORB. You simply cement the UNISORB pad to the machine base and the floor, let it set overnight, and the job is done. From the smallest grinder to the largest press, there is a grade of UNISORB to do the job right.

To get the complete story about this modern machinery mounting method, return the coupon today.

Look for the red center and UNISORB brand mark

The FELTERS Company
200 SOUTH STREET, BOSTON 11, MASS.
Offices: New York, Philadelphia, Chicago, Detroit, St. Louis
Sales Representative: San Francisco
Mills: Johnson City, New York; Millbury, Mass.; Jackson, Mich.; New York City

RETURN COUPON NOW! Please send me a copy of the booklet "Why It Pays to Anchor Your Machines with UNISORB."

Name..... Title.....
(Please Print)
Company.....
Address.....
City..... Zone..... State.....
Return to: The Felters Co., 200 South St., Boston 11, Mass.

Industrial work gloves get safety slogans printed on gloves, a free service by manufacturer in interest of safety. Slogans are printed to customers' specifications, and so far, have also dealt with maintenance, housekeeping, economy of materials, and the like.

Fairfield Glove Co, Fairfield, Iowa

Heat-protective clothing is insulated with Fiberglas. Designed for personnel exposed to abnormal heat, garments are made of aluminized glass cloth with Fiberglas insulation. One such outfit, consisting of jacket, trousers, boots, and air-supply or air-pack helmet weighs 26 lb. Moisture-resisting outer coating protects against scalding.

Fyrepel Products, Inc, Newark, Ohio

Cleaning compound, Oakite Composition No. 93, especially designed for steam-generating equipment and steam guns. Meets GSA standard P S 00751. Working concentration from ¼ to 4 oz per gallon of water. Non-toxic. Information on request.

Oakite Products, Inc, 124 Rector St, New York 6, NY

Temperature - indicating marking sticks have been developed for 282 F and 294 F, for particular use in the rubber industry, checking mold temperatures. Now available is a packaged set of five Tempilstiks®, for 275 F, 282 F, 288 F, 294 F, and 300 F.

Tempil® Corp, 11 W 25th St, New York 10, NY

Vu-O-Matic rotary stands are available for protection of small parts against corrosion in storage. At the end of a five-year test, screws, nails, and low-carbon steel parts stored in the jars were still free from rust. Three typical stands store parts in individual glass jars within a space 3 ft sq and 1 ft deep; each item is easily accessible and clearly visible.

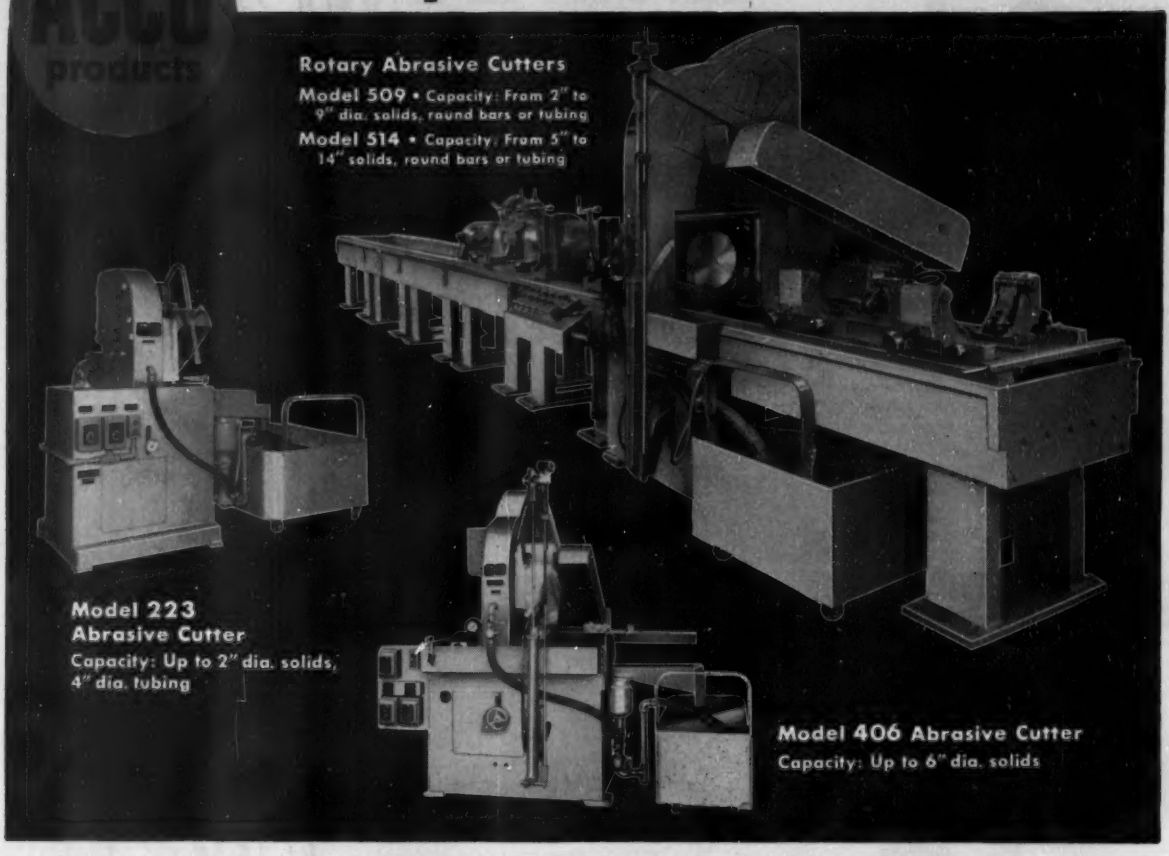
Union Metal Mfg Co, Canton, Ohio

Plastic balls for use as knobs on clutches, gears, and levers on machine tools, are available in three OD dias, 2, 1⅝, and 1 in. The 2-in. size is available with a ½ or ⅝-in. tapped steel insert, the 1⅝-in. size has a ⅜-in. tapped brass insert, and the 1-in. has a ¼-in. tapped hole. Said to be good thermal insulators with insulation against electric shock, and to have good resistance to heat and flame.

Jergens Tool Specialty Co, 712 E 163rd St, Cleveland, Ohio

Campbell Abrasive Cutters

ACCO products


Rotary Abrasive Cutters
Model 509 • Capacity: From 2" to 9" dia. solids, round bars or tubing
Model 514 • Capacity: From 5" to 14" solids, round bars or tubing
Model 223 Abrasive Cutter
Capacity: Up to 2" dia. solids, 4" dia. tubing
Model 406 Abrasive Cutter
Capacity: Up to 6" dia. solids

Quick cut-offs save you money—here's how . . .

By rapidly cutting stock that takes much longer by other cutting methods, CAMPBELL Abrasive Cutters reduce your labor costs and the number of machines required. They make quality cuts on alloy and high carbon steels. Close tolerances, smooth finish and straight cuts can be made, resulting in large savings of material. Cuts all types of stock without hardening and with minimum of burr.

It will pay you to remember these CAMPBELL features:

1. Superior Sales Engineering Service
CAMPBELL engineers, experienced in every type of cutting problem, are available for consultation on YOUR cutting problems.

2. Economy and Speed of Operation
CAMPBELL Abrasive Cutters are built to do every type of cutting job with the utmost accuracy, efficiency and economy. Cuts are smooth and practically burr free.

3. Complete Line of Standard Machines
CAMPBELL Abrasive Cutters are available in the widest variety of styles and models. They are fully automatic and semi-automatic. Have many exclusive features. . . .

Consultation with trained CAMPBELL engineers will cost you nothing. Let them show you how the addition, or substitution, of the right abrasive cutter can increase your output per man-hour. It could be the most profitable move you ever made.

Write today for Bulletin DH-301 on Campbell Abrasive Cutting Method

ACCO

Campbell Machine Division
AMERICAN CHAIN & CABLE
923 Connecticut Avenue, Bridgeport 2, Connecticut

Welded steel points the way for the product engineers who

WANT TO CUT PRODUCT COSTS 50%

Proper Design in Welded Steel is *Always* Lower in Cost

Material Cost is Less—It's a fact . . . steel is three times stronger than iron, two and a half times as rigid. Where strength alone is needed, one-third the metal is necessary. When rigidity is important, less than half the material is required. But steel costs only one-third as much per pound. Steel is more easily placed where it can carry more load per pound of metal. As a result, ultimate savings with steel are limited only by the resourcefulness of the designer.

Manufacture is Simpler—Fewer manhours . . . simpler, less costly production tools are needed to manufacture products from steel. By proper design, many operations needed for machining castings can be eliminated entirely. Assembly operations can be simplified . . . finishing and cleaning manhours reduced substantially.

Products designed in steel have a modern appearance to improve selling appeal while reducing costs on an average of 50% according to field reports.

Welded Design Saves 50% *on motor gear housing. Original cast construction weighed 175% more . . . required 90% more machining.*

Cost Down 57% *on machine stand by change to welded steel. Also eliminates former milling and drilling on former castings.*

HOW TO START A COST REDUCTION PROGRAM

Your Lincoln Representative is a specialist in welded design. We will gladly assist your engineers in restudying designs to determine where and how welded steel can save an average of 50% in the manufacture of your products. Call or write.

Design Bulletins also available to product engineers by writing on your letterhead to

THE LINCOLN ELECTRIC COMPANY
DEPT. 2003, CLEVELAND 17, OHIO

Peel Filmite, a fireproof spray booth paint film coat, applied with regular equipment, is said to have excellent resistance to alkalis, acids, oils, grease, fats, alcohol, and gasoline. White, opaque coating dries on an average in ten minutes. When paint overspray accumulates, operator scores coating and peels it off in big sheets.

The DuBois Co, 1120 W Front St, Cincinnati 3, Ohio

General-purpose aluminum alloy said to bridge gap between 61S, and 24S and 14S. In thickness to ¼ in., tensile strength is 50,000 psi; yield strength, 45,000 psi; elongation is 8%. Higher strengths in thicknesses above ¼ in.

Harvey Aluminum, Torrance, Calif

Fingerprint remover is said to have high (240 F) flash point, 30-day humidity cabinet test. Klad Kote 356 was developed to answer need for higher-flash-point fingerprint removing chemical, to reduce fire hazard.

R M Hollingshead Corp, 844 Cooper St, Camden, NJ

Factory access doors, called Ace DuraDor is made of lightweight plywood reinforced with steel and completely covered with a tough hide of soft rubber. Eliminates need for bumpers or automatic door opening devices. Closes tightly, is resistant to corrosion, said to require practically no yearly maintenance.

American Hard Rubber Co, 93 Worth St, New York 13, N Y

Pre-punched conveyor frames for variable spacing of rollers permit repositioning of rollers to suit changing requirements. Multiple spacing on various centers, such as 3, 6, 9, 12 in., and 4, 8, 12, 16 in. is furnished free of charge when specified.

Sage Equipment Co, 30 Essex St, Buffalo 13, N Y

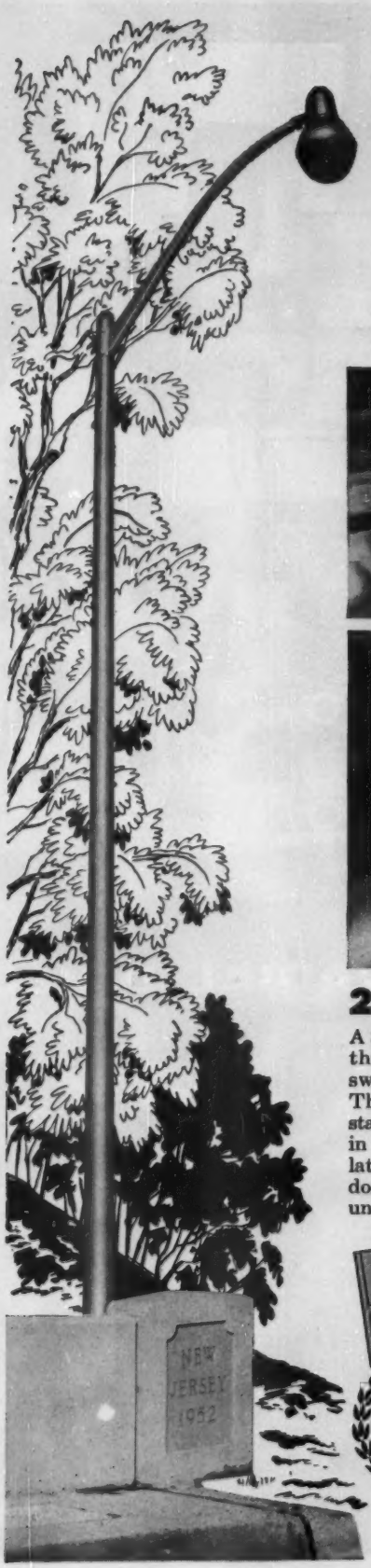
Electrical contact cleaner and lubricant is designed to reduce noise while cleaning electrical relays, switches, controls, and the like. Spra-Kleen is sold in 6-oz pressurized can.

General Cement Manufacturing Co, 919 Taylor Ave, Rockford, Ill

Elastic maintenance coating for light-duty corrosion resistance, Elprene is available in gray or black colors. Said to eliminate compounding on the job.

Atlas Mineral Products Co, Mertztown, Penna

UP in the AIR
FOR A
STAMPING
SOURCE?
GET DOWN TO EARTH with P.C.S.
PCS... POWELL CUSTOM STAMPING... has been a leading supplier of stampings to the automotive, appliance and allied industries for more than 30 years. If you're looking for experience, facilities, high quality workmanship and down to earth prices let PCS give you an estimate on your next job.
POWELL
PRESSED STEEL
PCS
CUSTOM STAMPING DIV.
THE POWELL PRESSED STEEL CO., HUBBARD, OHIO



HOW WOULD YOU Solve it?

1 PRODUCTION PROBLEM:

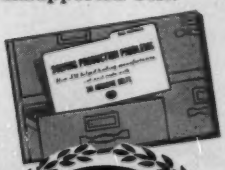
To cut unit costs of polishing aluminum street lighting standards. Pfaff & Kendall, Inc., was finishing one 30-foot pole per hour by hand sanding its entire length as it rotated in a lathe bed.

2 SOLUTION:

A 3M Representative suggested that this Newark, N.J. manufacturer switch to the 3M Method using Three-M-ite Resin Bond belts installed on two swing grinders mounted in tandem. Poles were rotated in the lathe bed as before. Polishing was done *behind* the contact wheel on the unsupported belt.

3 RESULTS:

An immediate production increase from 1 to 4 finished standards per hour, with a higher quality finish. Each belt finishes 10 or 11 poles, with far less operator fatigue. A 3M Representative can help *you* solve your polishing problems, too. His services are available without cost or obligation. Send coupon for facts.



3M ABRASIVES

Want More Information?

MINNESOTA MINING & MFG. CO.
DEPT. AM-54, ST. PAUL 6, MINN.

☐ Send me free booklet: "Case History Reports on 3M Abrasive Belts"
☐ Please have 3M Representative call

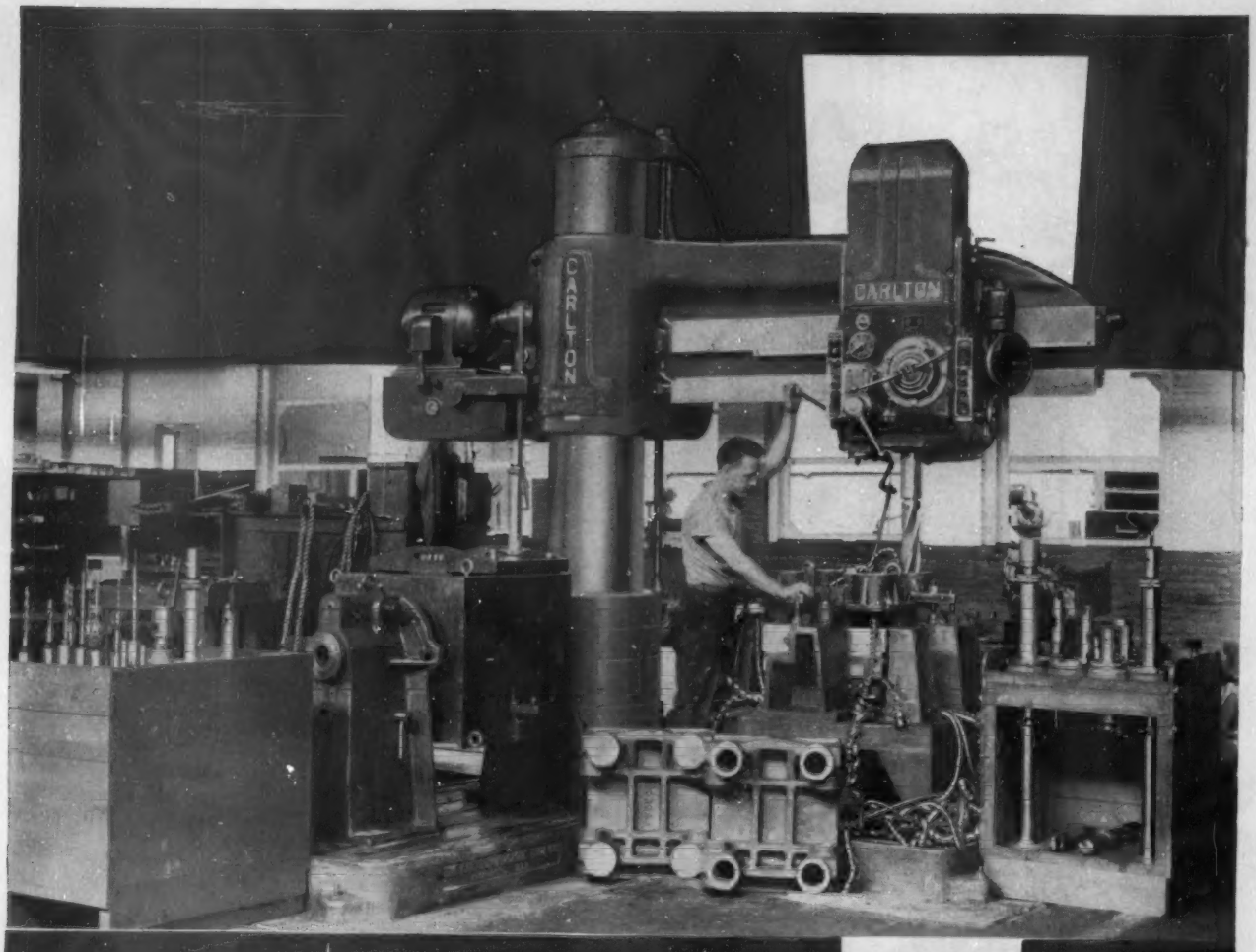
Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

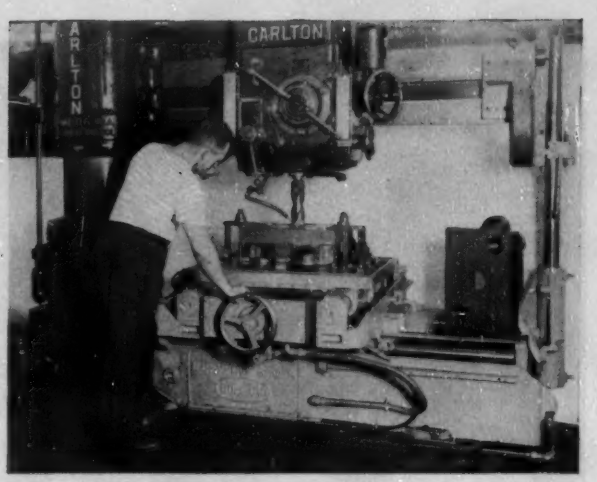
Made in U.S.A. by Minnesota Mining and Manufacturing Company. General Offices: St. Paul 6, Minn. In Canada: London, Ont., Can. Export: 122 E. 42nd St., New York City. Makers of "Scotch" Pressure-Sensitive Tapes, "Scotch" Sound Recording Tape, "3M" Adhesives, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing.



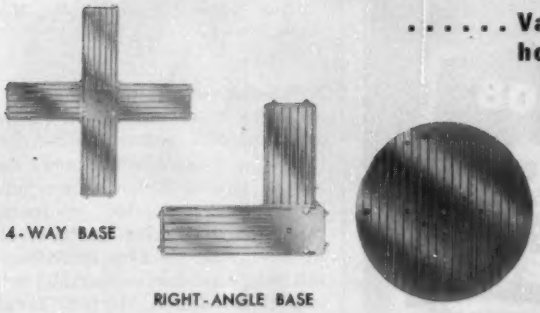
Carlton RADIAL DRILLS

Revolving Stands used under Carlton radial drills reduce boring and drilling costs 24.5% at Reed-Prentice Corp., Worcester, Mass. In the photo directly above, the Carlton radial has a double right-angle base which permits operator to work on the job at right while the one on the other base is being set up. This arrangement keeps the spindle drilling continuously.

Carlton Radial Drills are perfectly suited to production drilling and when properly tooled can reduce costs considerably over the bench-and-post method. The push-button control simplifies and speeds up operation. The box-and-V-type ways assures the necessary rigidity. And the accuracy and precision with which the Carlton column clamp permits elimination of bushing and jig boring.



Drilling versatility and accuracy. Holes from 5" to ⅝" in diameter are drilled in this set-up which shows a Bullard Man-Au-Trol spacer mounted on a 4A Carlton radial drill. Using the guide, the operator drills and bores a 5" center hole and two 4" tie-bar holes, and drills and taps 24 small holes in this Reed-Prentice plastic injection molding machine die plate.



. . . . . Variety of bases fit all production hole drilling requirements.

Carlton radial drills can be furnished with any of seven different types of stationary bases, three of which are shown here. And, there's a special track type mounting and a variety of plain or uni-tilt tables and revolving jigs . . . so that with Carlton you're sure to get the most efficient and profitable set-up for your requirements.

Cut Costs 24.3% at Reed-Prentice

Carlton Engineered . . . Carlton Tooled. Carlton engineers will be glad to work with your engineers in recommending the most efficient tooling for your Carlton radial drill . . . in making time studies and furnishing tooling costs. Just send us your requirements and we'll submit our recommendations promptly and without obligation.

Use convenient coupon. The Carlton Machine Tool Co., Cincinnati 25, Ohio.

Gentlemen: Send us your recommendation on how the Carlton radial drill, properly tooled, can save us money on the attached drilling requirements.

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

Accuracy ±.000008"
$291.50
84 BLOCK SET
For years Webber has dedicated itself to the production of gage blocks at a price that even the smallest shop can afford.
Quality and precision have not been compromised in this undertaking. Ask those who use them. Write for literature.
H. D. BLOCKS and FIXTURES
STANDARD STEEL BLOCKS
CROBLOX CARBIDE
ANGLE BLOCKS
Webber
GAGE COMPANY
12901 TRISKETT ROAD
CLEVELAND 11, OHIO
LARGEST EXCLUSIVE MANUFACTURER OF PRECISION GAGE BLOCKS

Removable fork extensions are available on Raymond Reach-Fork trucks. Outside pallet load can be picked up or deposited in the usual manner; inside load can be reached by extending forks, through scissors-design mechanism. Truck can right-angle-stack loads up to 48 in. long from aisles only 72 in. wide. Unit has a 2000-lb capacity at 24-in. load center.

The Raymond Corp, 47119 Madison St, Greene, N Y

Non-plasticized type I PVC needle, plug, and globe valves, in sizes from ⅛ to 2 in., supplement Ampcoflex structures and sheet available in thicknesses to 1 in., sizes to 48 x 108 in.

Atlas Mineral Products Co, Mertztown, Penna

Nylon-and-cotton breaker strip for conveyor belts uses nylon in warp direction, and cotton in filler direction, is said to make belt more flexible in length. Extra cotton added in filler is intended to increase resistance to gouging during loading. Breaker strip is also imbedded in soft white rubber compound, to add impact resistance. "Nyton" breaker available in all belts of US line.

U S Rubber Co, Rockefeller Center, New York 20, NY

Dalmotor Type PM-47 miniature permanent-magnet motor for lightweight-load applications is rated at 1/400 hp with operating rotor speed of 10,500 rpm. Designed for continuous duty, motor draws 0.18 amp at 27 v dc; weight, 5 oz.

Dalmotor Co, 1375 Clay St, Santa Clara, Calif

Electric marking pen has built-in magnetic vibrating system, so that steady light pressure on material being marked produces a continuous arc. Voltage is reduced to 2 to 7 v at tip. Newage Actograp pens have patented adjustment to write thick or thin line.

Newage International, Inc, 235 E 42nd St, New York 17, NY

Twin-faced brush, for mechanical cleaning, can be attached to power and hand-operated sweepers, and other applications. Tab-Strip is available with brushes at any angle from 90° to parallel, with various fillers, ranging from soft hair to rigid steel wire, in any length or trim desired, in several base widths.

Industrial Div, Stanley Home Products, Easthampton, Mass

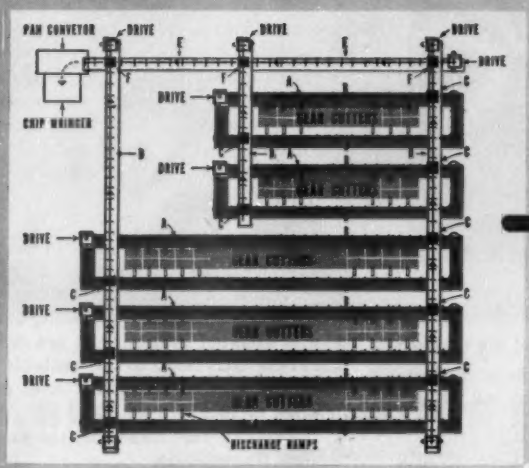
SAVE MANHOURS ...BOOST PRODUCTION

with **HOUDAILLE** automatic conveyors

AUTOMATIC, LOW COST HANDLING OF METAL-WORKING CHIPS, DUST, SCALE AND SLUDGE

Licensed under Hapman's patents Nos. 2,147,189 and 2,432,750

- Flights in steel tubes or open troughs carry materials which settle to bottom of tanks . . . continuous or intermittent operation
- Unlimited applications . . . readily adaptable to almost any space or traverse requirement . . . standard pipe sizes—3″, 4″, 6″, 8″
- System eliminates costly manual handling methods, speeds up production, pays for itself in maintenance savings alone
- Each Houdaille Conveying System "individually engineered" by Honan-Crane to solve your particular conveying problem

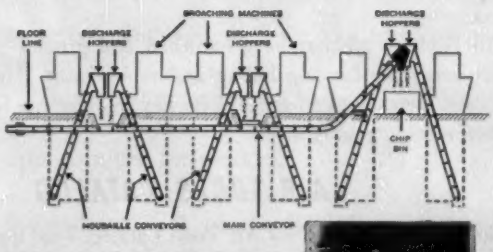


TYPICAL OPEN TROUGH CHAIN CONVEYOR LAYOUT

Nine 6″ Houdaille Open Trough Conveyors remove steel chips from 500 Gleason Gear Cutters in large automotive plant. Five conveyors pick up chips from troughs and discharge them at two points on each circuit. Then three more conveyors collect, transport and discharge chips into one main conveyor for ultimate disposal in chip wringer. Entire operation is automatic.

TYPICAL TUBULAR CHAIN CONVEYOR LAYOUT

Six Houdaille Chain Drag Conveyors remove chips from broaching machines in aircraft plant. Operating automatically and continuously, each conveyor services one machine. Chains and flights travel nine feet below floor level, use minimum floor space.



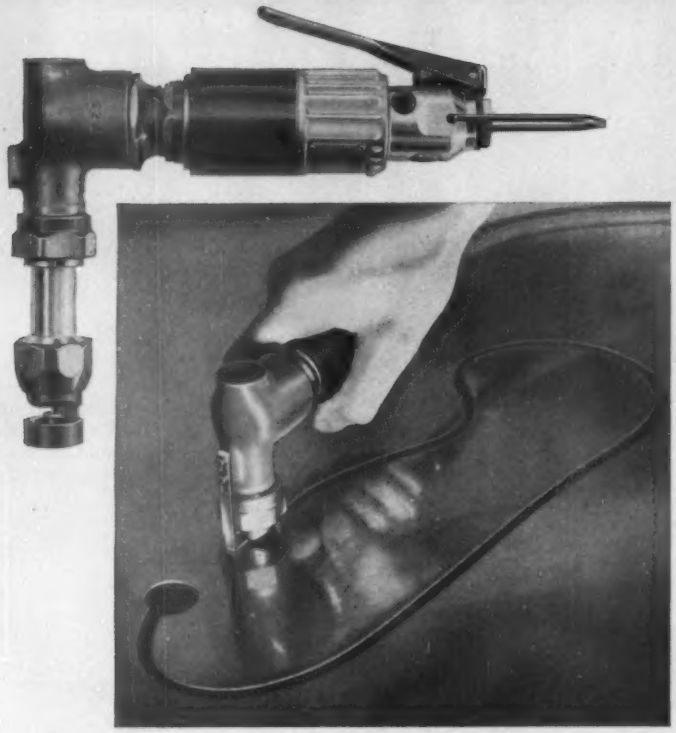
HONAN-CRANE CORPORATION
404 MADISON AVENUE, LEBANON, INDIANA
a subsidiary of HOUDAILLE-HERSHEY CORP.
In Canada: E. W. Playford, Ltd., Montreal 28
W. E. Micklethwaite, Toronto 18

new comprehensive catalog

with complete details on engineering features, capacities, typical applications and case histories of Houdaille Automatic Conveyors now available. Write for your copy today!

in portable nibblers

YOUR BEST BUY IS BUCKEYE



Buckeye portable air-powered nibblers eat their way through 18-gauge sheet metal, leaving a clean, sharp cut with no distortion of the exposed edges. They cut a radius as small as one inch, follow the most intricate contours swiftly and exactly. When working on panels already assembled in position, cutting can be started anywhere an access hole is provided for the nibbler. Extra-long throat model permits cutting in hard-to-reach areas.

All Buckeye nibblers have hardened and ground punch and anvil, easily accessible for re-grinding and replacement, if necessary. If you cut sheet metal up to 18-gauge, a Buckeye nibbler can become one of the busiest tools in your plant!

AIR TOOLS CATALOG

Write for your copy of our Air Tools Catalog. Trial test of any Buckeye tool, in your own plant, can be arranged without obligation.

Buckeye Tools CORPORATION
DIVISION 15 • DAYTON 1, OHIO

producers of the world's first successful rotary air tools

IN CANADA: Joy Manufacturing Co. (Canada) Ltd., Galt, Ontario

Skin-protective ointments to avoid effects of exposure to industrial irritants, such as organic solvents and solvent-borne irritants, for which Clerex is recommended; and water solutions and water-borne irritants, for which Hydrepel-A and S are offered.

Hygiene Research Inc, 684 Broadway, New York, NY

Multi-purpose pliers are said to be spark-resistant, corrosion-resistant and resistant to most acids. Non-magnetic, bronze. Long-nose style.

Ampco Metal, Inc, 1745 S 38th St, Milwaukee 46, Wis

Heavy-duty oil-tight indicating lights are available in six colors, for front or back mounting, in three forms—resistor, transformer, and full-voltage. Rated from 110 to 600 v, 10 amp continuous.

General Electric Co, Schenectady, NY

Rayon conveyor belts are said to have greater strength than cotton duck belts, with 1/3 less weight. According to manufacturer, rayon and other synthetic belts in field tests hold fasteners better than cotton. Marketed as U S Matchless and U S Giant.

U S Rubber Co, Rockefeller Center, New York 20, NY

Enamel stripper is said to remove Epoxy and most other enamels, working at room temperatures. Enamel is removed by wrinkling action, and stripper and enamel are water-rinsed off. Said to be suitable for brass, aluminum, steel, and other base metals.

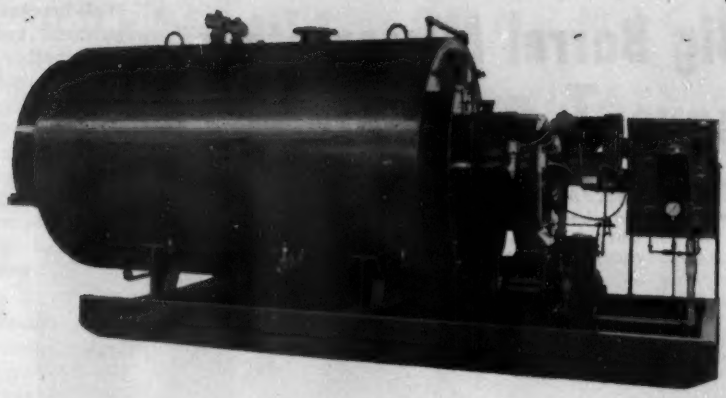
Enthone, Inc, Dept AM, 442 Elm St, New Haven, Conn

Empco style JD wedge-design leveling jacks have been strengthened, and design changes allow greater compensation for any unevenness of floors. Hexagon head of adjusting screw has been increased in size for easier wrench grip. Style JD-1 is for light to medium-weight equipment, JD-2 for medium-heavy, JD-3 for heavy duty.

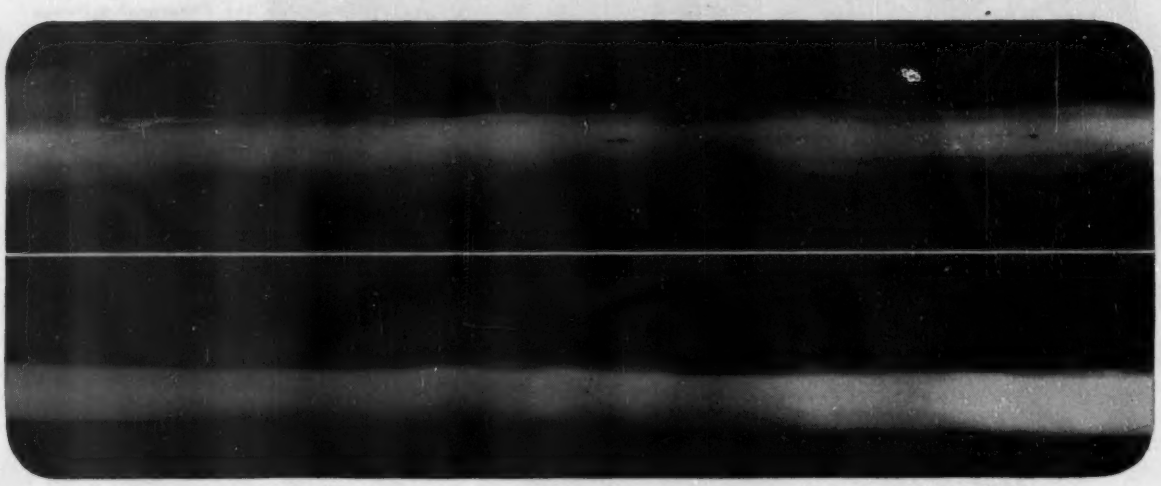
Enterprise Machine Parts Corp, 2731 Jerome Ave, Detroit 12, Mich

Cutting oils contain Petrofac, a petroleum-base wetting agent which is said to overcome problems of animal and vegetable oils. Sunicut W oils are described in bulletin available on request.

Sun Oil Co, Philadelphia 3, Penna



WEIGHT DOWN 15%—COSTS DOWN 10%



...BECAUSE *RADIOGRAPHY* PROVES IT SOUND

WELDING does great things for pressure vessels. Take this steam boiler for example. It saves 15% in customary weight—saves 10% to 20% in costs, depending upon design pressure. What's more, the job is smooth, clean and neat.

Welding can be used because Radiography proves every seam sound. It would be quick to reveal any serious lack of fusion or gas porosities.

This is just an example of how Radiography frees the designer's hand and widens the opportunities for welders.

It can increase your business. Want to know how? Get in touch with your x-ray dealer and talk it over.

EASTMAN KODAK COMPANY
X-ray Division, Rochester 4, N. Y.

Radiography...

another important example of Photography at Work

Kodak

New Big Barrel Micrometers have 7 Big Features

1 **Easy-to-Reach Ratchet Cap. A Lufkin Exclusive! With the ratchet right in the cap you can still take "one-hand" measurements. Ratchet is completely enclosed protecting it from dirt and grit.**

2 Big, Sensitive Direct-Feel Thimble.

3 Perfect Balance in Shorter Length.

4 Non-Glare Satin-Chrome Finish — easier reading in either bright or poor light.

5 **Easy-to-Read Markings Widely Spaced on Big Barrels. Circumference of the new barrel has been increased nearly 20%— wider spacings between graduations make it easier to estimate tenths of thousandths.**

6 Rapid Reading — Big Numbers Mark Every Thousandth. Graduation lines are longer and clearer.

7 **Slip-proof Black Crackle Finish on Frame. A Lufkin Exclusive. This durable and attractive finish makes the micrometer easiest to handle, especially when hands are oily.**

Designed by LUFKIN for Faster, Easier, more Accurate Measurements

This new micrometer is designed to make it the best balanced, easiest and most accurate to use. Lufkin micrometers are the easiest to adjust, too — the reading line always keeps its original position directly in line of vision, and the thimble doesn't cover measurements on the hub. Hardened and ground one piece spindle. Micro-lapped anvil and spindle faces. Tapered frame for use in restricted space. Available with carbide-tipped anvil and spindle faces.

306 BUY LUFKIN TAPES - RULES - PRECISION TOOLS FROM YOUR DISTRIBUTOR

THE LUFKIN RULE COMPANY, SAGINAW, MICHIGAN
132-138 Lafayette Street, New York City • Barrie, Ontario

Wall-bracket for CO_2 fire extinguishers has built-in indicator to tell whether extinguisher is full or empty, avoiding manual inspection and weighing. Silent Sentry is adjusted to index mark when full extinguisher is placed in bracket, and unit is locked and sealed. Unit then indicates continuously from full to empty. No wear parts.

Mel-Rod Manufacturing Co, 11616 Hart St, North Hollywood, Calif

Button-head coupler for Rockwell high pressure lubrication systems, has positive shut-off device to prevent leakage from grease gun when it is removed from fitting. Rockwell "400" button head coupler has ¼-in. pipe thread pull-on and top connections.

Rockwell Manufacturing Co, 400 N Lexington Ave, Pittsburgh 8, Penna

Pouring spout, type SO, of acid-resistant rubber and plastic tubing, is designed to avoid splashing and fumes. Fits bottle openings from 1 to 1⅜ in. Flow capacity, 1 gpm. Price, $4.35.

General Scientific Equipment Co, c/o John P Eldridge, 1412 Packard Building, Philadelphia 2, Penna

Striped adhesive tape is intended to eliminate painting plant of hazards. Yellow and black striped "Hazard-stripe" comes in 2-in.-wide rolls, with 1½-in.-wide tape, in choice of three materials: cloth-backed, vinyl-backed, and reflective-backed. Samples and literature on request.

Westline Products Div, Western Lithograph Co, 600 E Second St, Los Angeles 54, Calif

Photo-templet material made by impregnating glass fiber cloth with a blend of polyester resins. Resulting material is said to have dimensional stability of metal it replaces, but with transparency of tracing cloth. Templet can be copied using any of the usual sensitizing materials.

Tru-Scale Engineering Supply Co, Wichita, Kan

Forging primer is brushed, sprayed, or dipped before heating, and is said to greatly reduce scale, saving on cleaning cost of forged parts.

Spekaluminite Co, 100 S Water St, Ossining, NY

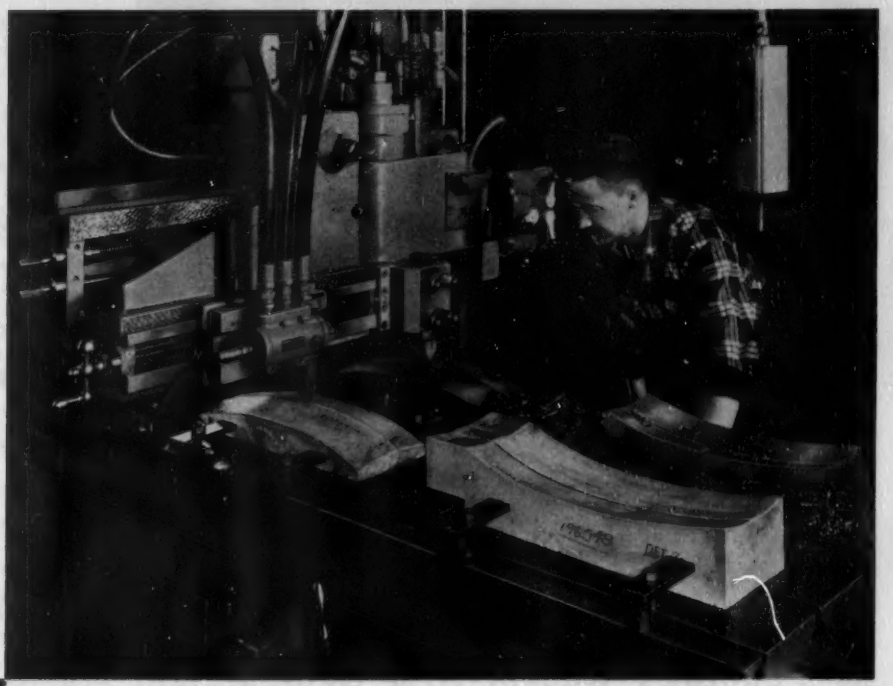
Vinyl plastic tapes are UL approved, available in eight colors, four widths, from ⅜ to 1 in.

Van Cleef Div, Johns-Manville Corp, 7800 Woodlawn Ave, Chicago 19, Ill

DUPLICATE FORM MACHINING

DIRECT TRANSFER • NO INTERMEDIATE MOTION

with ROCKFORD KOPY-KAT duplicator



Hy-Draulic

535

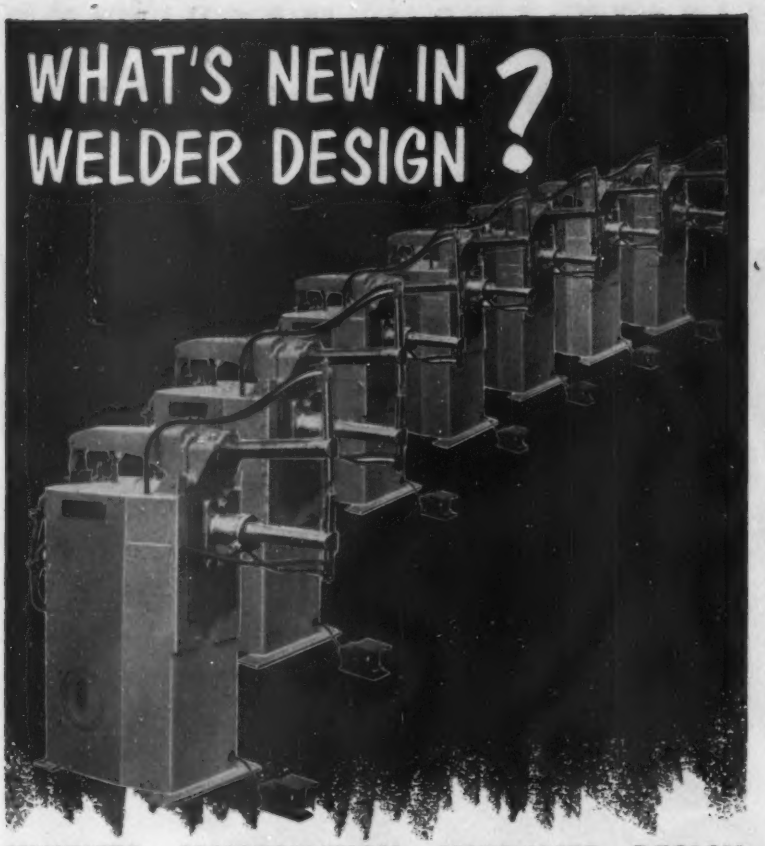
Inaccuracies are eliminated in duplicate form machining with Rockford Kopy-Kat Duplicators due to the absence of intermediate motion. Here, a Kopy-Kat Duplicator is shown reproducing a three-dimensional form, transferring the form directly to the cutting tool on a Rockford Openside Shaper. The hydraulic duplicator valve is so sensitive, so exact, that positive duplication of complex forms is done with the ease of straight-production machining.

A Rockford Machine Tool Co. Representative will show you how Kopy-Kat duplicating simplifies your form-machining problems. Get the full details from him, with examples on many varied and complex forms and shapes.

ROCKFORD MACHINE TOOL CO.

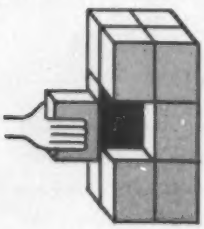
2500 KISHWAUKEE STREET, ROCKFORD, ILLINOIS

WHAT'S NEW IN WELDER DESIGN?



UNITIZED CONSTRUCTION, IMPROVED DESIGN of Federal's Rocker-Arm Spot Welder MEANS BETTER WELDS, FASTER, LOWER UPKEEP

UNITIZED DESIGN
A Federal Exclusive!



Component parts of each system are sectionized and mounted on individual, removable panels. Normal "down-time" is reduced to an absolute minimum; maintenance greatly simplified.

Federal's New Rocker Arm Spot Welders—redesigned from base to tip—to deliver highest production with a minimum of operating and maintenance costs. Feature for feature they are the outstanding low cost spot welders of this type available today.

Here's a few of the many features: Unitized Design, built in sections for easy maintenance and interchangeability; More Space, tapered frame permits greater working areas; Compact Construction, trims bulk—all lines are outside frame—easily accessible without unsightly and dangerous protrusions; Ferrule Fittings, with threaded couplings, permit quick, simple disconnect of all water and air connections; Low Loss Cylinder of new design boosts efficiency as does the new style Low Inertia, streamlined Horn Raising Lever. It's all new! It's welding efficiency at it's finest. It's another reason why welding engineers trust "Federal—First in Resistance Welding."

THE FEDERAL MACHINE AND WELDER COMPANY

WARREN, OHIO

Federal® WELDERS

Warco® PRESSES

Gear pump, Eclipse EO, handles wide variety of problems, from light liquids, at 1725 gpm, to molasses, heavy oils, and the like, at slower rates. Permits pressures to 100 psi, rotating in either direction. Details on request.

Eclipse Fuel Engineering Co, Rockford, Ill

Heat-resistant paint, Heat-Rem, now available in metallic red and metallic blue, consist of aluminum flakes in silicone base. Said to resist temperatures to 1700 F, fusing to surface when heated. Brush or spray application, air-drying in about 30 min.

Speco, Inc, 7308 Associate Ave, Cleveland 9, Ohio

High precision hydraulic control valve incorporates pilot pressure valving, to control to close tolerances. Trace Master is especially adaptable to control valving for contouring with machine tools. Details on request.

Hydraulic Research and Manufacturing Co, 2835 N Naomi St, Burbank, Calif

Polyester film, Mylar, that looks like cellophane, but acts differently, is being used in variety of applications, such as electrical insulation, various tapes, yarns, thermal insulation, metal laminates, and drum liners.

E I DuPont de Nemours & Co, Wilmington, Dela

Oilproof abrasive silk cloth is said to give very high polish, because cloth is not injured by presence of lapping oil, which improves finish. 400-grit abrasive, "Auto" cloth.

Crown Abrasive Co, Inc, 1841 Broadway, New York 23, NY

Master comparison slides, for use in inspection of diamond abrasives permit quick, accurate check of diamond particles for grading and purity. Slides, used with a microscope, permit examination of particles ranging from 1 micron to 100 mesh through comparison of diamond powder or compound with diamond on master slide. Determination of impurities may be made with the aid of a polarizing attachment.

Elgin National Watch Co, Abrasives Div, Elgin, Ill

Triple-action lifting pump on Big Joe foot operated trucks for loads to 250 lb., triples speed raising from 1⅛ to 3½ in. per foot-stroke.

Big Joe Manufacturing Co, 900 W Jackson Blvd, Chicago 7, Ill

The Shaft Shows the Holding Power of ALLENPOINT Set Screws

ALLENPOINT—Smooth, even bearing surface. Deep point penetration for maximum holding power.

SERRATED POINT—Shaft penetration is slight and irregular. Bearing surface is spotty and rough.

Loosen a Set Screw and Look at the Shaft It's Pressing Against.

Has The Set Screw Made A Full Circle Impression?

To obtain the maximum resistance to rotation and sliding movement, a set screw must bear evenly on the shaft. Allenpoint Set Screws reproduce a full circle pattern against their mating surface for increased holding power. Even on shafts of small diameter you get a full circle impression with the smaller cup point of Allenpoint Set Screws.

Has The Point Left An Uneven Ridge Around The Indentation?

The holding power of a set screw will be greatly reduced if the bearing surface is rough and irregular. Serrated point set screws cut into the shaft, raising a chip, removing stock and weakening their grip. Allenpoint Set Screws press firmly into the shaft and form a smooth, deep indentation. The result is holding power that tops any other type point.

WHEN ORDERING THROUGH YOUR LOCAL INDUSTRIAL DISTRIBUTOR, SPECIFY ALLENPOINT SET SCREWS

For additional information contact your Allen Distributor or write to —

ALLEN HEAD

ALLEN

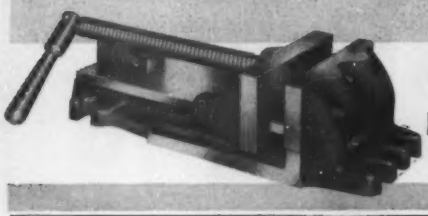
MANUFACTURING COMPANY

Hartford 2, Connecticut, U.S.A.

Here's PROOF that ~~SPEED VISE~~ is a fast production tool

Here's a production set-up on a multiple spindle semi-automatic drilling machine that is really cutting manufacturing time and costs. The use of two Speed Vises eliminates the need for expensive and complicated fixtures and at the same time increases the production range. With Speed Vise it is only necessary to make a simple jaw plate to fit the parts being machined and to hold drill bushings, etc.

★ Quick action design for speed. Opens instantly to full capacity to handle work of any size.
★ Standardized holes for attaching jigs or jaw plates.
★ Lift...slide...lock...that's all there is to the fast, positive locking action.
★ Heavy, semi-steel castings for extra strength and a heavy base plate for rigidity.



Write now for Bulletin 30-AM

CARDINAL MACHINE COMPANY

1819 Dana Street, Glendale, California

Everybody knows this sign stands for dangerous curves ...and smart gear buyers know this sign CINTI stands for the best in custom gears.

CINTI "Gears...Good Gears Only"

THE CINCINNATI GEAR CO. • CINCINNATI 27, OHIO

Industrial hand hacksaw assortment, No. 100 Disston Di-Mol Assortment, has 100 12-in. blades of various numbers of teeth per in., providing wide range of cutting materials. Bulletin on request.

Henry Disston & Sons, Inc, Tacony, Philadelphia 35, Penna

Paint stripper is said to remove vinyl enamel from phosphatized aluminum without damaging base metal. Immersion in Octastrip 33 for ½ to 1 hr is said to permit lifting paint from surface with little trace of paint remaining on surface.

Octagon Process, Inc, 15 Bank St, Staten Island 1, NY

Bellofram seals (bellows and diaphragm principle) are characterized by long stroke, deep convolution, constant area diaphragms, with increased flexing life and extremely low spring gradient. Because they are reportedly extremely responsive to small changes in pressure, seals are particularly adapted to precision instrument applications.

Bellofram Corp, 144 Moody St, Waltham, Mass

Cable slack compensator, developed by Northrup, has been designed to eliminate slack in aircraft control system cables. An anchor nut holder is also available for positioning and holding anchor nut plates in alignment for attaching plates to aircraft structural parts.

E H Stau Co, 351 N Atlantic Blvd, Los Angeles, Calif

Styron 688 material for use in injection molding reportedly flows faster and more evenly throughout the mold. Particularly useful in such applications as thin wall containers, vials and tubes, back-painted parts. Tests indicate better parts, faster cycles, and fewer rejects result.

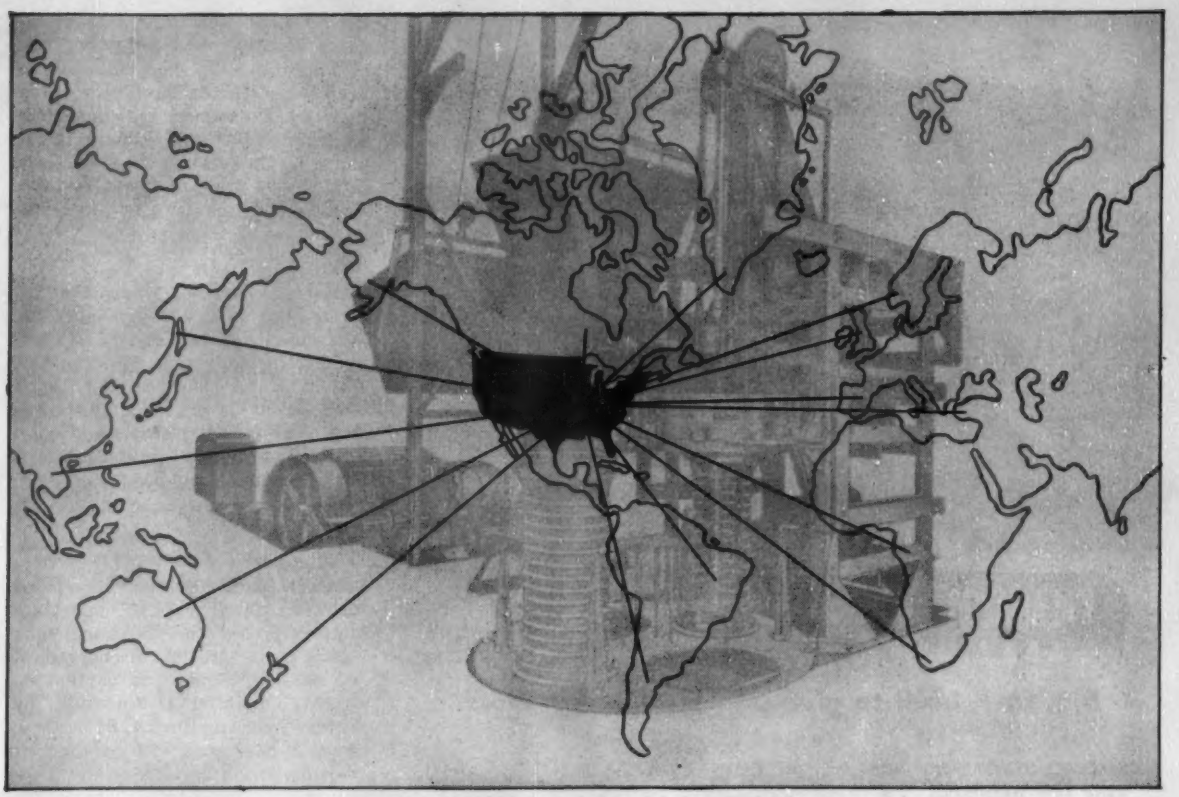
The Dow Chemical Co, Midland, Mich

Nylon control knob, because of its exceptional strength, eliminates need of metal bushing. Model 1431, designed to fit any shaft up to ¼-in. dia, measures ¾-in. dia at skirt and 1¼ in. along the bar. Unit has high insulation characteristics.

Industrial Devices, Edgewater, NJ

Carbide-pointed scriber has solid aluminum handle and protective point cover. Price, $1.35.

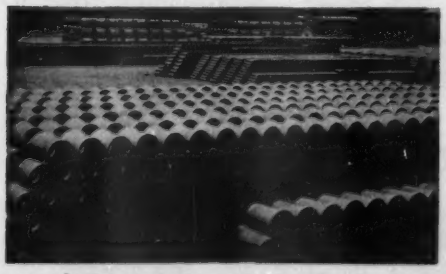
Wendt-Sonis Co, Hannibal, Mo



From Sioux City, Iowa:

CITIES SERVICE OILS AND GREASES SENT ALL OVER THE WORLD WITH McCRACKEN MACHINES!

"OUR FINISHED MACHINES are completely serviced with Pacemaker 2 hydraulic fluid, Optimus 4 oil in the transmission and Trojan M for bearing grease."



CORRUGATED CONCRETE PIPES, used for sewer, culvert and irrigation work, are one of industry's most vital tools. McCracken Machines make the very finest.

ONE CITIES SERVICE PRODUCT SOLD MANUFACTURER ON THE COMPLETE CITIES SERVICE QUALITY LINE!

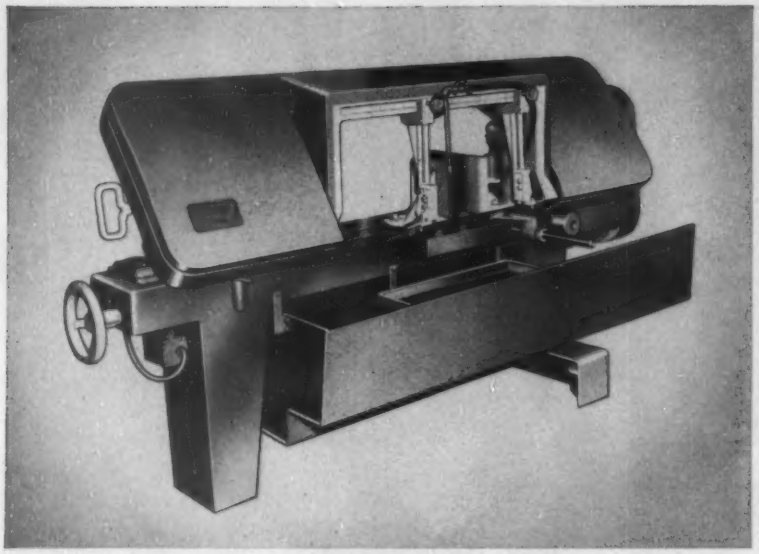
During the early part of World War II, Concrete Pipe Machinery Co., manufacturers of McCracken Machines, called in a Cities Service Lubrication Engineer for answers to some tough metal-cutting problems. On his recommendation, they tried Cities Service Cutting Oil, Chillo 93. Finished work was so improved and tool life so prolonged, that Concrete Pipe had a complete lubrication survey made of their plant.

THIS CAREFUL SURVEY PROVED THAT THE COMPLETE CITIES SERVICE LINE COULD DO THE BEST JOB FOR THEM. Electric motors, spindles, gear reducers, air compressors . . . drilling, grinding, machining of cast iron parts, threading, tool and die work . . . hydraulic systems, bearings, transmissions . . . Cities Service Industrial Oils, Greases and Cutting Oils did better on every job! Concrete Pipe Machinery Co. says: "They are giving us outstanding service, and availability and delivery have always been excellent."

If you'd like to talk to a Cities Service Lubrication Engineer, write Cities Service Oil Company, Sixty Wall Tower, New York 5, New York, or call the office nearest you.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS



KALAMAZOO

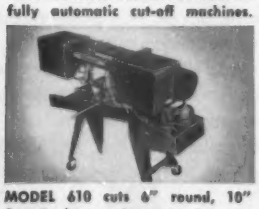
MODEL 1220 METAL CUTTING BAND SAW

big, fast, built to give you high production

KALAMAZOO METAL CUTTING BAND SAW MACHINES . . . a model to meet your needs.

MODEL 8C cuts 8" round, 16" flat, 8" pipe. Coolant equipment and casters available.

KALAMATIC BAR FEED ATTACHMENT converts Kalamazoo saws to fully automatic cut-off machines.



MODEL 610 cuts 6" round, 10" flat. Coolant equipment and casters available.

CUTS 12-INCH ROUND, 20-INCH FLAT, 12-INCH PIPE

Accurate to a few thousandths, with minimum burr and kerf.

Four cutting speeds and variable frame weight adjustments provide a selection for various jobs — better sawing results, longer blade life.

Available with coolant equipment for uninterrupted production sawing — without coolant for intermittent cutting and for non-ferrous metals.

Designed throughout for maximum safety. All moving parts fully enclosed — only cutting section of saw blade is exposed.

Heavy duty 1 HP motor provides ample power for all cuts.

ASK YOUR *KALAMAZOO* DEALER FOR DETAILS AND DEMONSTRATION of the rugged Model 1220.

MACHINE TOOL DIVISION

Kalamazoo TANK and SILO COMPANY

535 HARRISON STREET . . . KALAMAZOO, MICHIGAN

Plastic Lead Seal pipe thread and gasket sealing compound is available in 1-lb brush-top cans, eliminating need for cleaning applicator after each use. Compound withstands pressures up to 6000 psi, temps to 500 F, and is insoluble in water, steam, gas, refrigerants, and petroluem products.

Crane Packing Co, Dept AMN, 1800 Cuyler Ave, Chicago 13, Ill.

Cemented carbide grade 370 for heavy-duty steelcutting is available in a wide range of standard, stocked blanks. Include: styles 1000 and 2000 3/16-in. thick and smaller; style 0000 blanks ¼-in. thick and over; style 5000 (pointed nose standards); clamped-on blanks, and all inserts not previously announced.

Carboloy Dept, General Electric Co, Detroit 32, Mich

Pressure filter has been developed for dewatering granular materials. Material is fed into the machine in slurry form, and is discharged at less than 10% moisture content by weight. Operation is automatic, by means of electric timers. Shop air at 85 psi is employed with average air consumption of 15 cfm; power is required only for solenoid valves and timer. Capacities range up to 5 tons per hr of 100-lb of material.

Hydro-Blast Corp, 2550 North Western Ave, Chicago 47, Ill

Type F pushnuts are steel fasteners which slip easily over unthreaded studs or rods, and lock tight with a push of an applicator; for use on nameplates, mouldings, and other light parts. Available for 3/32, ⅛, and 3/16-in. unthreaded studs or rods in plain steel, Parkerized, or cadmium finishes.

The Palnut Co, 61 Cordier St, Irvington, NJ

Wales Comproils are compressible liquids used in Wales Hydra springs. Development combines principle of liquid compressibility at ultra-high pressures with lubricity. One of widest uses is in cushioning applications. Also used in hydraulic systems.

Hydra Springs Div, Wales-Strippit Corp, 345 Payne Ave, North Tonawanda, NY

Kits are available in all popular sizes of Rosan locked-in studs or inserts. Each contains one size of inserts or studs, with locking rings, installation tools, and directions.

Rosan, Inc, 625 Coast Highway, Newport Beach, Calif

DUMORE ANNOUNCES THE

NEW Series 9 handgrinder

. . . for heavy-duty production jobs such as cleaning casting and weld seams, spark testing steel, polishing and grinding heavy and irregular work.

Voltage — 115V, 230V AC-DC
Current — 3.1 amps.
Horsepower — ¼
Speed, no load — 15,500 rpm
Duty cycle — continuous
Bearings — ball
Winding connection — series

Arbor extension, optional at nominal cost

Std. ¼" collet chuck

Ventilation — internal fan
Temperature rise — 40° C
Finish — grey
Weight of complete unit — 6 lbs., 14 oz. with cord, 6 lbs., 8 oz. less cord
Length including wheel guard — 16⅝", 17¾" with chuck
Small dia. — 1²³/₃₂" ave.
Body dia. — 3½"

COMPACT and well balanced, the new Series 9 is powered by a ¼ hp continuous-duty-rated Universal motor which develops 15,500 rpm. Available for 115V or 230V, DC or AC, 0-60 cycle operation. It weighs only 6 lbs., 14 oz. It features quality construction throughout. Three precision bearings, seated in steel inserts integrally cast into the grinder housing, assure long life and accuracy.

For facts on the three new Dumore handgrinders, see your industrial distributor or write —

DUMORE PRECISION TOOLS

The Dumore Company

1337 Seventeenth Street • Racine, Wisconsin

Builders of precision line of Grinders, Automatic Drill Heads, Tool Post Grinders, Drill Grinders, Light Drilling Equipment, Flexible Shaft Tools, Hand Grinders, Fractional hp Motors and Gear Motors.

New!

All-new Series 35 Dumore Handgrinder

Here's a "midget miller," with speeds to 35,000 rpm, for use with tungsten carbide mills, high-speed cutters, mounted wheels and points, abrasive bands, etc.

Voltage — 115V, 230V AC-DC
Current — 3.0 amps
Horsepower — ¼
Speed, no load — 35,000 rpm
Duty cycle — continuous
Bearings — ball
Winding connection — series
Weight—3 lbs., 3 oz. with cord
Length — incl. chuck 10¾"
Small dia. — 1-5/16"
Body dia. — 2-7/16"

New!

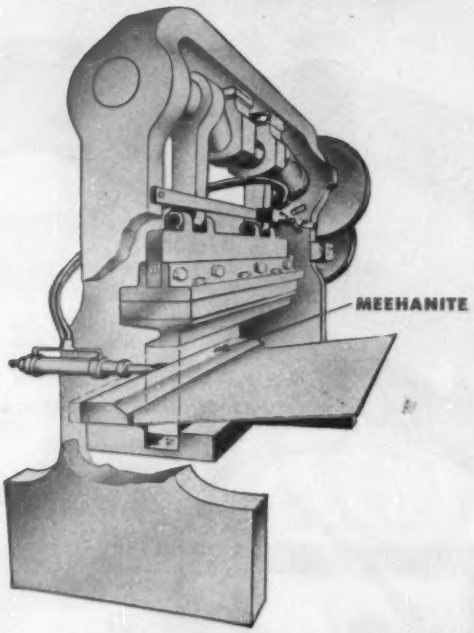
The Dumore Super-10 Precision Handgrinder

. . . for both tool and die work where accuracy is a must and production bench work where full shift production is necessary.

Voltage — 115V AC-DC
Current — 1.4 amps
Horsepower — 1/10
Speed, no load — 22,000 rpm
Duty cycle — continuous
Bearings — ball
Winding connection — series
Weight—3 lbs., 1 oz. with cord
Length — incl. chuck 10¾"
Small dia. — 1-5/16"
Body dia. — 2-7/16"

The MEEHANITE® Casting Reporter

MEEHANITE BACK GAGE SAVES $100 PER DAY



In order to reduce production costs on a power brake, the manufacturer devised an automatic flanging die with a movable back gage which permitted the forming of 6 different bends with a single set-up. Materials handling savings amounted to $100 per day.

Originally the back gage, key to the operation, was made of hardened and ground steel but wore rapidly as a result of the horizontal thrust of the sharp edges of the steel sheet being worked.

The use of Meehanite metal for this gage solved the wear problem and three years after the installation the unit had gone through 9 million operations without removal for maintenance, repair, or straightening.

The manufacturer states **"The ability of Meehanite metal to meet the service requirements permitted the successful design and operation of the machine."**

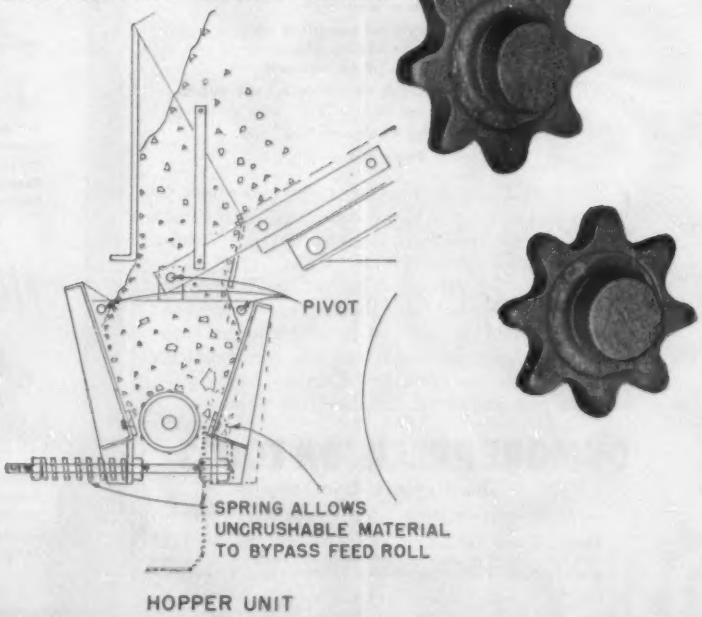
MEEHANITE SPROCKET INCREASES SERVICE LIFE THREE TIMES

In a sand and cinder spreader used for skid-proofing icy roads the operation of the material hopper is dependent upon a drive sprocket unit. The material being spread is fed between a feed roll and compression springs allow movement of the hopper sides in the event of hard, uncrushable pieces being passed.

The drive sprocket, when cast in high property bronze gave trouble through shearing at the clutch face when subjected to the high stresses created when hard and large lumps of material went through the hopper.

When produced as a Meehanite casting, the sprockets, after heat treatment, provided sufficient impact strength and abrasion resistance to eliminate breakage.

The manufacturer reports **"that substantial cost savings have resulted and the operating life of the Meehanite sprocket is generally three times that of the previous material."**



HOPPER UNIT

WHAT MEEHANITE CASTINGS HAVE DONE FOR THEM

HEAT TREATED MEEHANITE SCORING ROLLS REDUCE COST- IMPROVE WEARING QUALITIES

The ability to heat treat Meehanite castings and obtain increased hardness and greater wear resistance is revealed in the use of these castings for corrugated paper box scoring rolls.

The abrasive forces set up by corrugated paper are high and it is essential that the grooves and beads of the scores be machined to a high degree of accuracy. This, of course, is costly, and makes each days' service life important.

One large manufacturer of corrugated paper boxes declares: **"We use Meehanite rolls exclusively and find that the life of the units has been more than doubled since the specification of this material."**

ONLY A MEEHANITE FOUNDRY CAN MAKE MEEHANITE CASTINGS

American Brake Shoe Co. . . . . Mahwah, New Jersey
The American Laundry Machinery Co. . Rochester, New York
Atlas Foundry Co. . . . . Detroit, Michigan
Banner Iron Works . . . . . St. Louis, Missouri
Barnett Foundry & Machine Co. Irvington and Dover, New Jersey
E. W. Bliss Co. . . . . Hastings, Mich. and Toledo, O.
Builders Iron Foundry . . . . . Providence, Rhode Island
Compton Foundry . . . . . Compton, Calif.
Continental Gin Co. . . . . Birmingham, Alabama
Crawford & Doherty Foundry Co. . . . . Portland, Oregon
The Cooper-Bessemer Corp. . Mt. Vernon, Ohio & Grove City, Pa.
DeLaval Steam Turbine Co. . . . . Trenton, New Jersey
M. H. Detrick Co. . . . . Newark, N. J. and Peoria, Ill.
Empire Pattern & Foundry Co. . . . . Tulsa, Oklahoma
Farrel-Birmingham Co., Inc. . . . . Ansonia, Connecticut
Florence Pipe Foundry & Machine Co. . Florence, New Jersey
Fulton Foundry & Machine Co., Inc. . . . Cleveland, Ohio
General Foundry & Manufacturing Co. . . . Flint, Michigan
Georgia Iron Works Co. . . . . Augusta, Ga.
Greenlee Foundry Co. . . . . Chicago, Illinois
The Hamilton Foundry & Machine Co. . . . Hamilton, Ohio
Hardinge Company, Inc. . . . . New York, New York
Hardinge Manufacturing Co. . . . . York, Pennsylvania
Johnstone Foundries, Inc. . . . . Grove City, Pennsylvania
Koehring Co. . . . . Milwaukee, Wisconsin
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NEW BOOKS

METAL CUTTING TOOL HANDBOOK (3rd Edition)—*Published by the Metal Cutting Tool Institute, 405 Lexington Ave, New York 17, NY. 689 pages, 6 x 9 in. Price $6.50.*

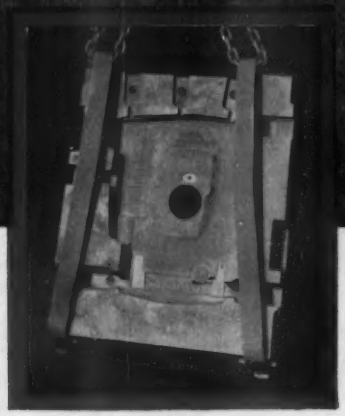
This handbook, first published in 1949 and revised in 1950, has now been extensively rewritten. The book covers drills, reamers, counterbores, taps and dies, milling cutters, gear hobs, gear-shaper cutters, gear-shaving cutters, broaching tools, and general engineering data. It gives for each tool the nomenclature, types, sizes, suggested speeds and feeds, troubleshooting, associated tabular data, and a great deal of standard information. Each section is, in fact, the cooperative product of the several Institute members producing that particular tool type. Thus also included is all the information on how to order special types when standard types will not do the job. Latest standards are incorporated as well, so the volume is as up-to-date as a magazine article.

Added in this edition is a section on gear shaving. Hob and shaper data have been placed in separate sections, and many sections have been completely rewritten to include latest data, standards, and improvements. This is a must for the man in charge of selecting, providing, or operating what is often called "small" or "perishable" tools.

•

WERKSTOFF-HANDBUCH STAHL & EISEN (MATERIALS HANDBOOK, STEEL & IRON) THIRD EDITION. *Published by Stahleisen Verlag, Dusseldorf, Germany. 130 pages, 5¾ x 8¼ in. Loose leaf in ring binder. Price 78 DM.*

Every known property of iron and steel is dealt with in comprehensive, yet compact, form in this remarkable book. The first section contains general information, such as specific gravities, atomic weights, periodic system of elements, metric-British conversion tables, tolerances, etc. The second section describes the physical (and a few chemical) properties of iron and steel, and the methods of testing them. Corrosion, soldering, hardenability, and machinability are included. Section three shows how properties are affected by production processes and by composition. Almost all the commonly used alloy steels—as well as carbides—are discussed. The fourth section, entitled



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We're not about to tell you Lindberg Steel Treating Company is solely responsible for the power lawn mower industry. That isn't exactly the case. But, along with dozens of designers, engineers, and production men, we kicked in our two cents worth.

Quite a few power lawn mowers have cast aluminum shells . . one of them is the "Lawn-Boy" made by *Outboard Marine & Manufacturing Company**. "*Outboard*" needed mold dies to produce these mower shells . . and the dies had to be heat treated. They were intricate, had plenty of irregular sections, and they were worth $15,000.

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A case history of Lindberg Steel Treating Co. service to American industry

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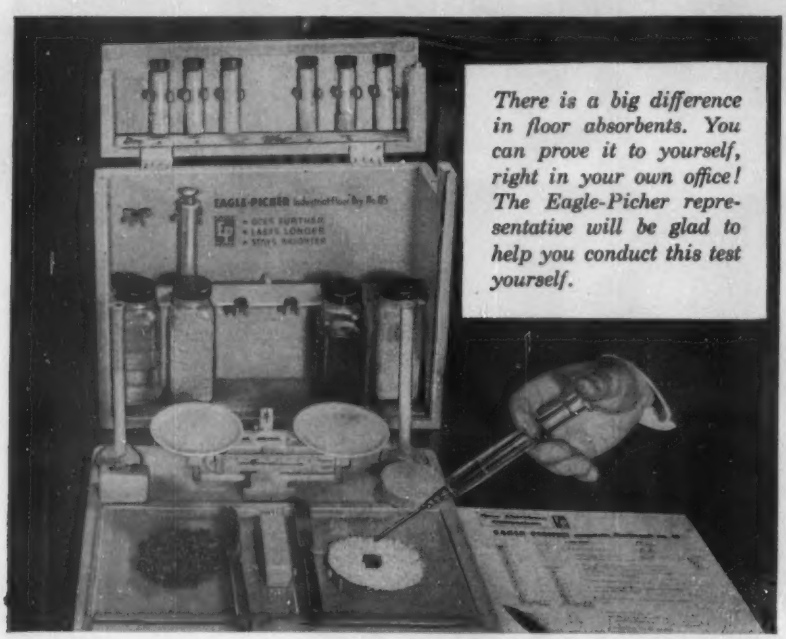

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Purchasers are requested to send their addresses to the publisher, so revised sheets may be sent to them from time to time.

It is impossible, in a brief review, to do justice to this book, which deserves unstinted praise. After reading it from cover to cover, this reviewer decided to keep it, rather than to follow his usual custom of donating reviewed German books to an engineering library. — *Reviewed by W Trinks.*

•

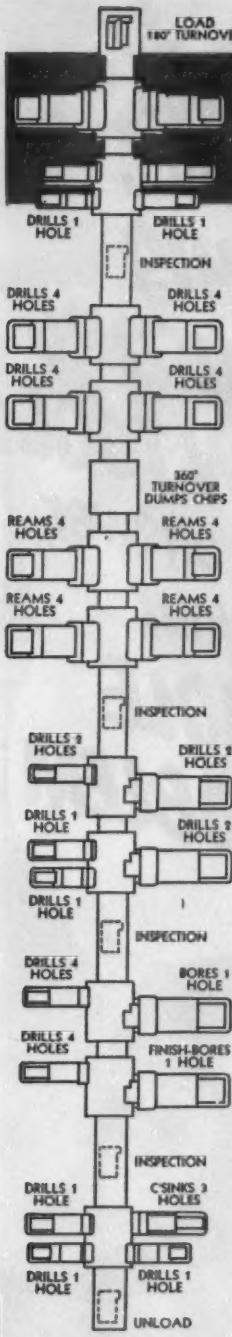
MECHANICS OF MATERIALS *(Third Edition)—Philip G Laurson and William J Cox. Published by John Wiley & Sons, Inc, 440 Fourth Ave, New York 16, NY. 414 pages, 5½ x 9 in., hard cloth bound. Price $5.75*

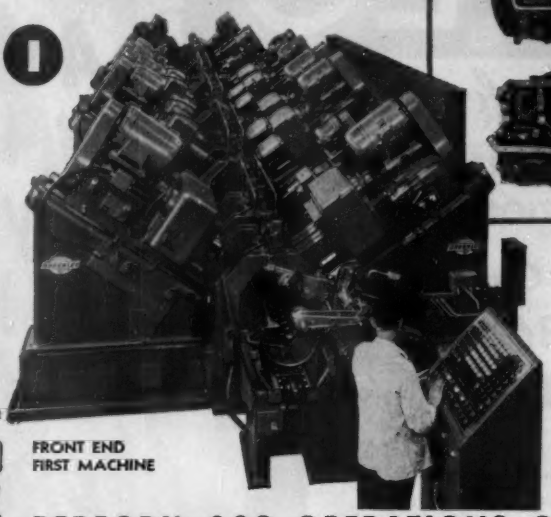
Revised contents of book are well written and organized for standard courses in mechanics (strength of materials). Subject matter proceeds from simple to complex aspects of principles and methods used in design of ordinary structural and machine parts. Each chapter contains numerous problems based on actual well-known engineering structures and machines. In this third edition, increased emphasis has been placed on the statics of stress deformation and the postponement of the material on stresses determined by deformation.

"Because you parked next to the fire extinguisher."

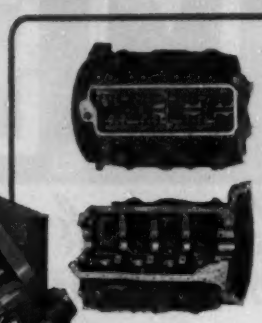
GREENLEE

TRANSFER MACHINES

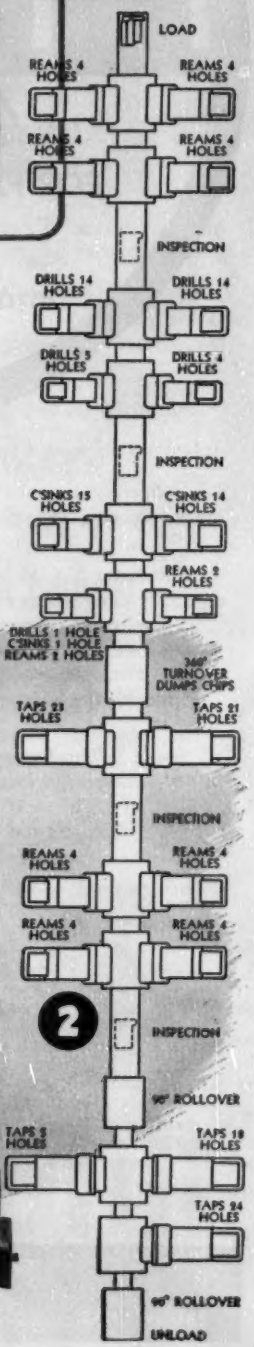




FRONT END
FIRST MACHINE



NEW V-8 BLOCKS



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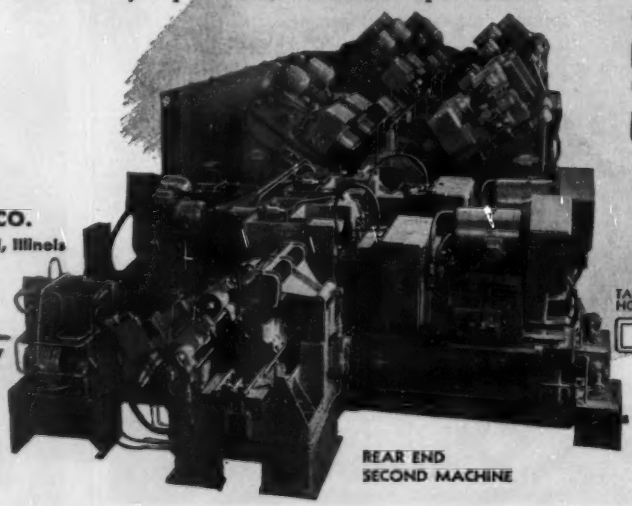

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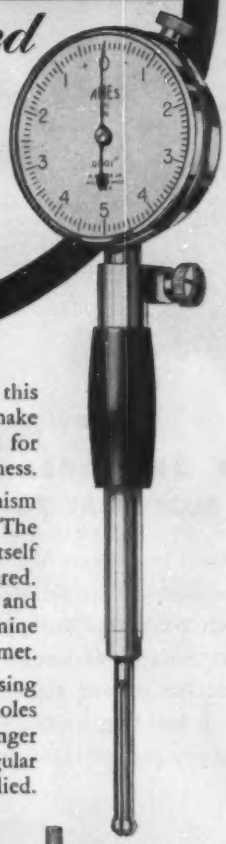

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THE NEW SERIES 92A KELLER "AIRFEEDRILL"

—locks to any jig or fixture, and drills accurately. Stationary mounting brackets available

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—handles peck drilling and skip drilling

—gives complete control over motor speed, drilling speed, torque, rate of advance, and depth of hole

It has these operating features:

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TORQUE CONTROL causes automatic retraction as often as necessary to clear chips during peck drilling. It also protects drills and indicates when they need sharpening.

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VARIABLE SPEED MOTOR controlled by throttle valve . . . shuts off automatically at end of drilling cycle.

Lightweight and compact—ideal for use in portable or stationary applications

These and other features mean that you can tool up for a few hundred dollars . . . instead of thousands. Send for Catalog Section 92 which fully describes and illustrates this remarkable new tool.

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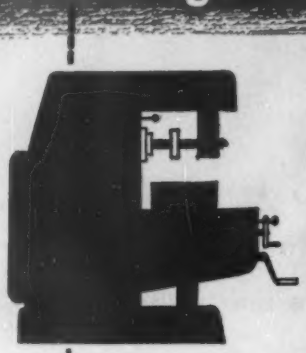

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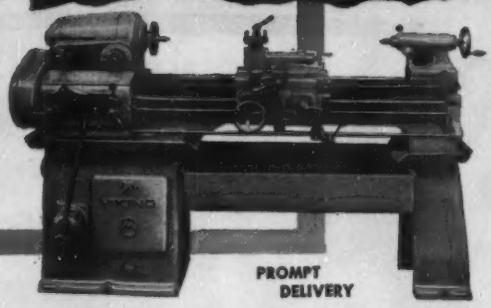

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PARTIAL SPECIFICATIONS

Distance between centers	30", 40", 60"
Swing over bed	13¾"
Spindle speeds (RPM)	35-1200
Motor	3 HP

For complete details write to Dept. A-4

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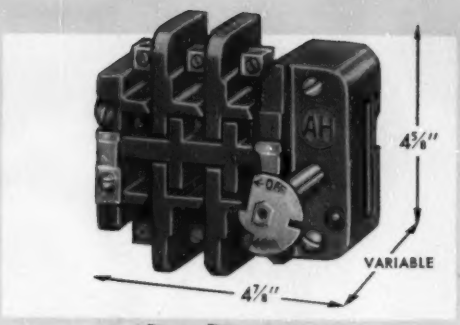

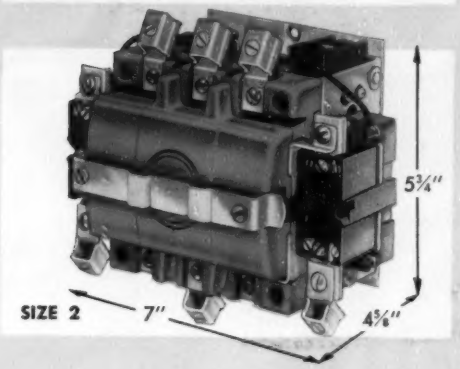

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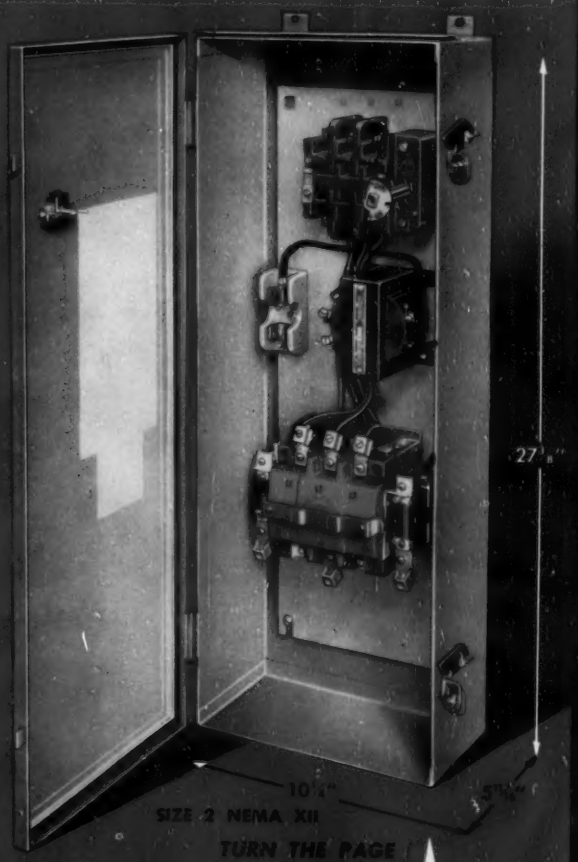

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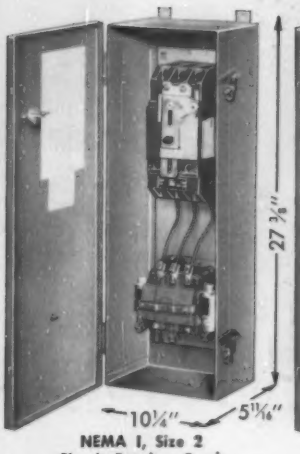
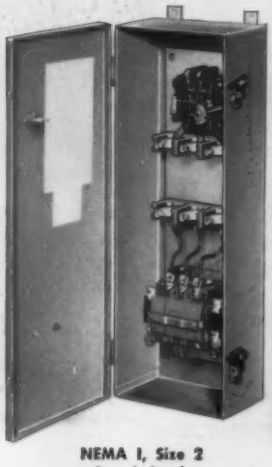
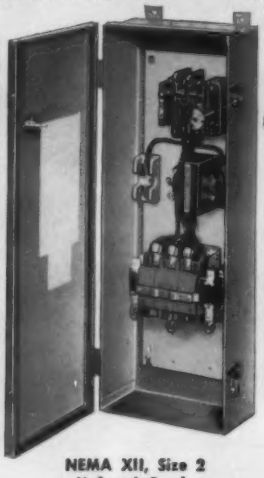


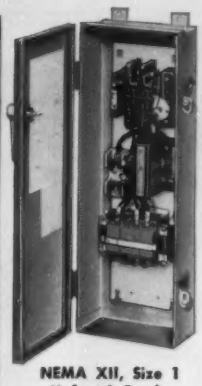
NEMA I, Size 2
Circuit Breaker Comb.



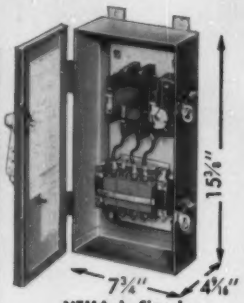
NEMA I, Size 2
Fused Comb.



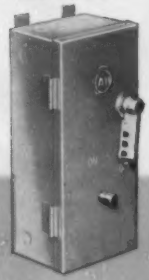
NEMA XII, Size 2
Unfused Comb.



NEMA XII, Size 1
Unfused Comb.



NEMA I, Size 1
Unfused Comb.



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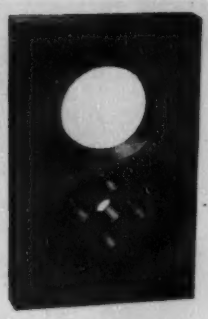
YOU GET *SPEED* PLUS ACCURACY WITH MOORE JIG GRINDERS



HOLES from 1/64" to 8" Relocated and Ground within .0001" in One-Third Previous Time

Before hardening, this two-station die block was Moore-Jig-Bored to eliminate the need for excessive grinding. After hardening and surface grinding, all holes were Moore-Jig-Ground to exact size and location. Blank hole and center piercing hole were ground with ½° included taper. Little clearance could be allowed between punch and die. Jig grinding time: *only 2¼ hours.*

CONTOURS, Too, Accurately Jig Ground and Checked in One Setting

This flanged punch, impractical to grind by any other method, was a natural for the No. 2 Moore Jig Grinder. All radii—male and female—were ground accurately to location and size. The piece, having been set up on a rotary table, was aligned to permit grinding of the angular surfaces. And the entire contour was inspected by the "indicator measuring" method while the punch was still on the machine.

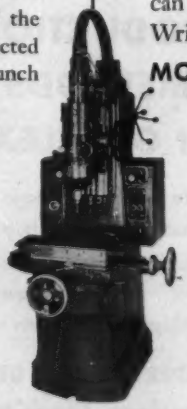
The word "versatile" must have been coined for the No. 2 Moore Jig Grinder. Not only does this machine relocate and grind straight and tapered holes with ease, but it contour grinds, chop grinds and slot grinds just as skillfully.

The Moore Jig Grinder, together with its toolroom teammate, the Moore Jig Borer, enables tool and die sections to be produced concurrently, puts diemaking on an interchangeable-parts-and-assembly basis. And it's also a time-saver on production jobs.

Employing the accurate lead screw measuring principle and a convenient system of coordinate hole location, the fast and sure Moore Jig Grinder eliminates hours of checking on bench and surface plate.

Why not find out how this remarkable machine can save *you* sizeable chunks of time and money. Write today for our detailed bulletin.

MOORE SPECIAL TOOL COMPANY, INC.
738 Union Ave., Bridgeport 7, Conn.



NO. 2 MOORE JIG GRINDER
Range 10" x 16" x 16" height. Grinding speeds from 12,000 to 60,000 rpm. Infinite feeds up and down; spindle-housing heat control. Features slot grinding attachment.

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTO-CRUSH WHEEL DRESSERS • DIE FLIPPERS • MOTORIZED CENTERS • HOLE LOCATION ACCESSORIES

see our catalog in MACHINE TOOL CATALOGS or write for copy

do jobs too tough for HSS, not tough enough for Carbide
New CIRCOLOY Combines Advantages of other steels in general use
Fills the performance gap between carbide and high speed steels — lets you restrict use of carbide and HSS to uses they serve best.
Suited for tougher work but can be used for regular cutting jobs — because it outlasts HSS.
Longer life, longer production runs, superior cutting, does operations efficiently that HSS cannot handle satisfactorily.
Unlike carbide, needs no special handling — can be reground on any standard grinding apparatus.
New to market, but proved efficient and economical in production tests for over 1 year in plants all around the country.
Circoloy metal cutting saws, thickness 1/16" to 1/4", now offered in same line as our regular HSS circular cutting tools.
Developed through 30 years of experience producing the best available tools of high speed steel, solid tungsten carbide, carbide tipped.
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SLITTING DISCS • SOLID & TIPPED TUNGSTEN CARBIDE SAWS • COMBINED DRILLS COUNTERSINKS & CENTER REAMERS
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12" stroke on base only 16⅜" long. Or smaller model, 9" on 13⅜" base. LONG STROKE makes it easy to change tools. TRAVERSE RATE over 400" min., FEED RATE up to 30" min. CAPACITY ½" in steel.

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Here are details of unique precision production methods at Graflex, Inc., Rochester. An *American Machinist* Special Report. 20 pages, illustrated, 25 cents a copy.

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AT LAST!

LOW-COST CLARIFICATION for finish grinding coolant

with

THE NEW AUTOMATIC HOFFMAN MAGNA-FLOMASTER COMBINATION

Removes waste solids from mineral oils and water soluble coolants.

20 and 40 g.p.m. models — 40 g.p.m. model shown.

In fine finish grinding operations absolute clarity of coolants is imperative if product finish is to be protected. The new Hoffman Magna-Flomaster Combination not only delivers a coolant so clear that it can be used over and over again, thereby eliminating the expense of large purchases of make-up coolant, but also ends messy maintenance chores once and for all.

With the Magna-Flomaster Combination coolants are actually doubly protected because they get double clarification. First by the Magnaflo where 75% to 90% of ferrous solids are settled out or removed by a magnetic plate. Second by the Flomaster Filter where wheel grit and "fines" are removed. The savings resulting from the use of clear recovered coolant, plus minimum maintenance expense, add up to a truly low-cost operation.

Write for technical bulletins giving full details

HERE'S WHAT YOU GET

- Complete protection of finish
- The finest filtering at full flow rates Removes particles from 20 down to 5 microns
- Low cost operation — low filter load gives almost double the normal cartridge life
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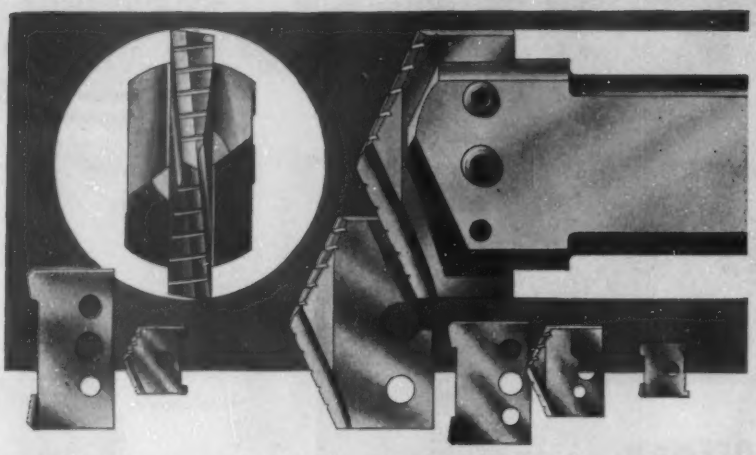
- Reduced maintenance costs. No filter bags to change — no plates to scrape down. Flomaster Filter cartridges take only a few minutes to change
- Near-dry sludge for easy disposal

Hoffman INDUSTRIAL FILTRATION DIVISION

INDUSTRIAL FILTRATION EQUIPMENT & ENGINEERING

IN CANADA: Canadian Hoffman Machinery Co. Ltd.

U. S. HOFFMAN MACHINERY CORP., 241 LAMSON STREET, SYRACUSE 6, N. Y.



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Made in 256 cutter sizes, 1 to 5 inch diameter, in steps of 1/64, Conner type Spade Drills drill the required diameter in one operation, need no retracting to clear them of chips. Only eight sizes of holders are needed to handle all cutter sizes.

For general purpose work and in the Tool Room, use the cutter and holder assembly shown above. It is a rugged tool of great rigidity, recommended for large holes of medium depth.

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For Boring: Core Drill Cutters, for semi-finishing of cored and drilled holes, are made in the same 256 sizes, to fit the same spade drill holders.

The Gairing Tool Company is now the exclusive manufacturer of the Spade and Core Drills, both standard and special, formerly made by the Conner Tool & Cutter Company.

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- HARDENED PHOSPHOR-BRONZE adjustable gib retains accuracy
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- 3 GRADUATIONS - 1/1000" - 1/128" 1/10 mm in back

$14.75 PPD

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A ruggedly built grinder that will give long, dependable service under hard use. Ideal for rough or precision grinding. The motor is enclosed in the pedestal and drives through a V-belt. This removes the weight of the grinding wheels from the motor bearings and practically eliminates vibration. Moreover, it isolates the motor from abrasive dust and provides greater work clearance.

SPECIFICATIONS

Wheel Size: 8" dia. (½ h.p. motor), 10" dia. (¾ h.p. motor).

Spindle: Approximate speed 2450 r.p.m. Sealed ball bearings.

Motor: Standard 2875 r.p.m. 50 cycle or 3450 r.p.m. 60 cycle. Also D. C.

Over-all Dimensions: 49½" high, 18" wide, 20½" deep (10" Grinder ½" wider).

8" — $245.00; 10" — $248.00 each less motor and remote control equipment. Time terms: 10% down — balance in 12 months. f.o.b. factory.

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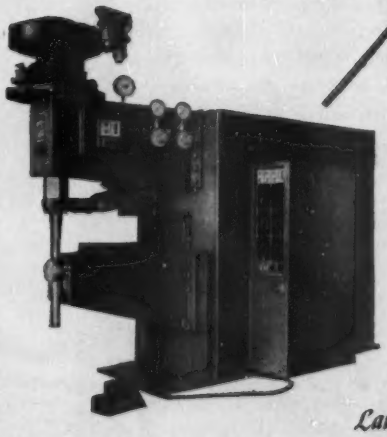
Building Better Tools Since 1906

South Bend MACHINE TOOLS



Spotwelding of Scrap Sheet Titanium Forms Solid Ingots for Machined Parts

A six inch pile of 85 laminations of .064 titanium with two laminations at each end of .091 titanium is joined with one weld on a Sciaky type PMCO 6ST 400 KVA Three-Phase Spot Welder. The weld nugget forms a solid ingot of virgin metal at least as strong as the parent metal. This ingot can be machined into a variety of titanium parts. Months of lead time required for titanium is avoided and expensive scrap is utilized.

Developed by the Manufacturing Research and Development Unit of the Glenn L. Martin Company, this technique offers another fine example of Sciaky basic thinking in design of resistance welding equipment to do *more useful work* at *lowest operating cost* with *maximum reliability.*

Largest Manufacturers of Electric Resistance Welding Machines in the World

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CLARK EQUIPMENT COMPANY
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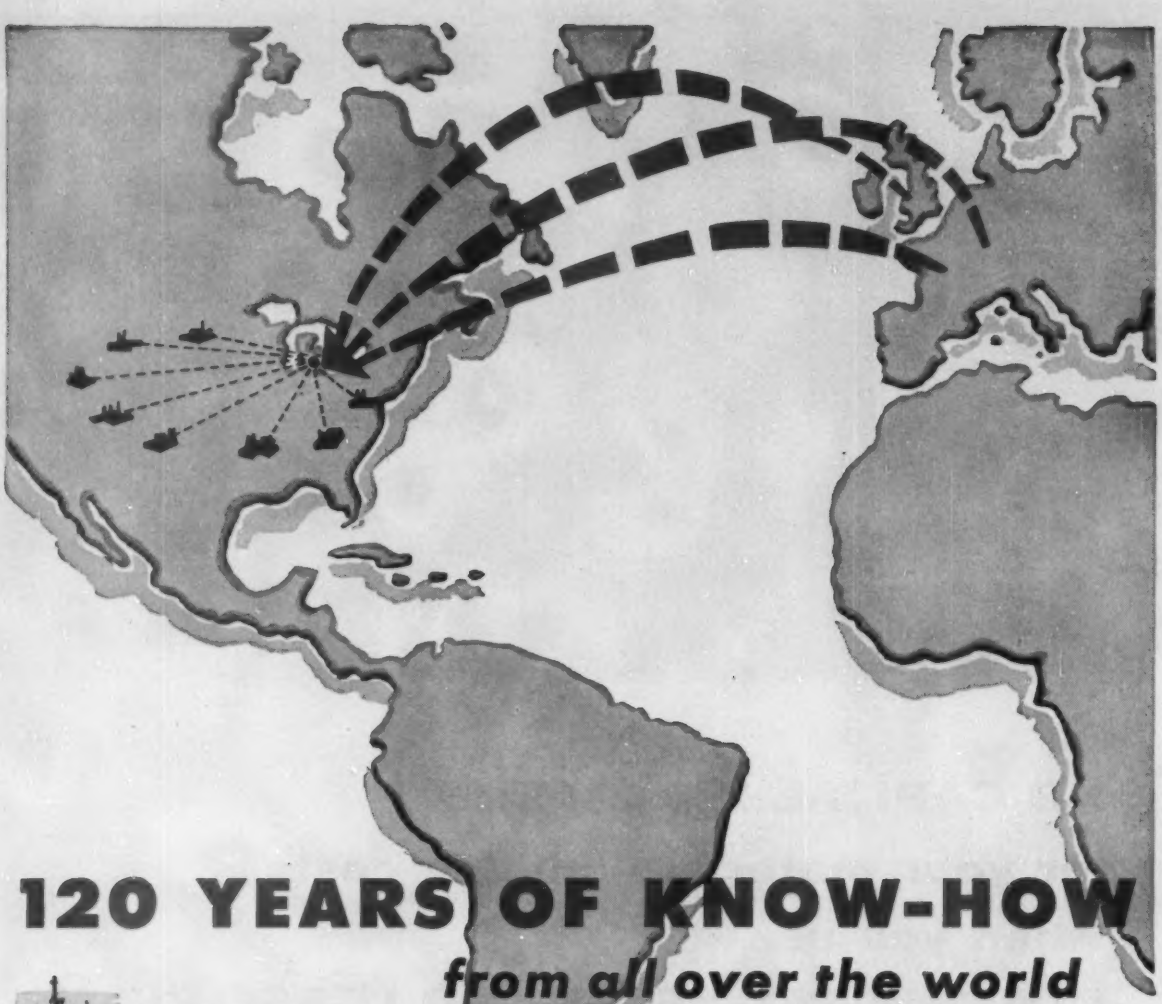

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from all over the world flows into your plant from PARKER

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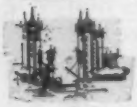

The Pyrene Company, England — **28** years

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Our customers, through our international affiliations, get the benefits of world-wide research, experiment and application.

For the best in surface treatments for metals, call on Parker!

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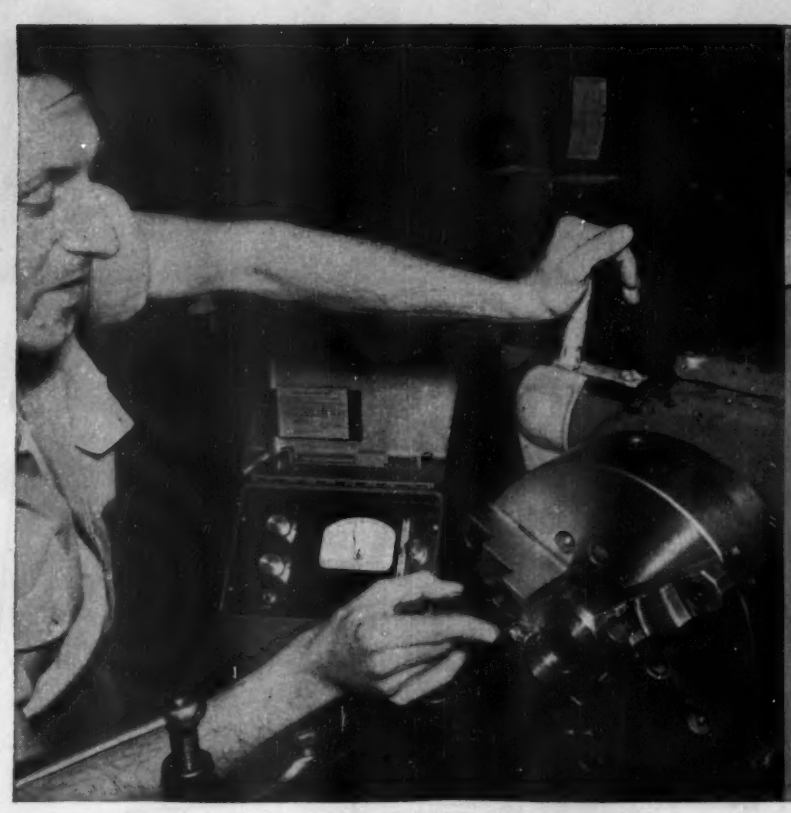
BONDERITE	BONDERITE and BONDERLUBE	PARCO COMPOUND	PARCO LUBRITE
corrosion resistant paint base	aids in cold forming of metals	rust resistant	wear resistant for friction surfaces



SURFINDICATOR*
meets every surface measurement problem

The standard pickup for the SURFINDICATOR is hand operated, permits measurement of virtually all shapes, from 5/16" O.D. to 1/2" I.D. The new accessories shown above—motor drive and small bore adapter—extend the usefulness of the instrument. Motor drive speeds inspection where large numbers of identical parts are involved. Adapter permits measurements in very small diameters—as small as 1/4" I.D.—and other limited areas.

*Trade Mark

See how easy it is to measure **SURFACE ROUGHNESS**

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TRY IT YOURSELF! Write for a copy of this booklet on Surface Finish Control. Or, ask for a demonstration of the SURFINDICATOR in your plant by a Brush engineering representative. Send coupon now. Brush representatives are located throughout the U. S. In Canada: A. C. Wickman, Limited, Toronto. Brush Electronics Company, Cleveland 14, Ohio.

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LANSING, MICHIGAN
DROP FORGING CAPITAL OF THE WORLD

LANSING, capital city of Michigan, is famous for many things, particularly in the automotive field, but it is unique among the industrial cities of the United States in the concentration of drop forging activity in its many factories. Indeed, Lansing may well lay claim to the title of "Drop Forging Capital of the World", for its annual production of forgings, according to recently published figures, was 208,000 tons, or more than 11% of all the forgings produced annually in the United States, which was 1,885,662 tons.

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Located in Lansing are six great forging plants, covering 14 acres of land, with a working area of over 985,579 square feet and representing an investment in excess of $26,000,000. Annual payrolls of these companies total in excess of $15,520,000.

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All these great forging companies are using Chambersburg Ceco-Drops. The first was installed in Shop No. 1 in 1947, the year the Ceco-Drop was introduced. In 1948, Shop No. 4 installed two Ceco-Drops and Shop No. 3 installed one. In 1950 Shop No. 2 installed two, and Shop No. 4 repeated with one. In 1951 Shop No. 2 repeated with two and Shop No. 4 again repeated with two. Also in 1951 Shop No. 3 repeated with two and Shop No. 6 installed eight. In 1952 this shop repeated with three and Shop No. 3 repeated with one. That same year Shop No. 5 installed three. In 1953 Shop No. 2 repeated with one and Shop No. 4 with two more.

Write for details

CHAMBERSBURG ENGINEERING COMPANY

CECO-

STORY..

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THE FIRST CECO-DROP IN LANSING WAS INSTALLED HERE. THIS COMPANY SPECIALIZES IN AUTOMOTIVE FORGINGS. CECO-DROP IS FORGING AUTOMOBILE CONNECTING RODS—A TOUGH JOB.

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DROP

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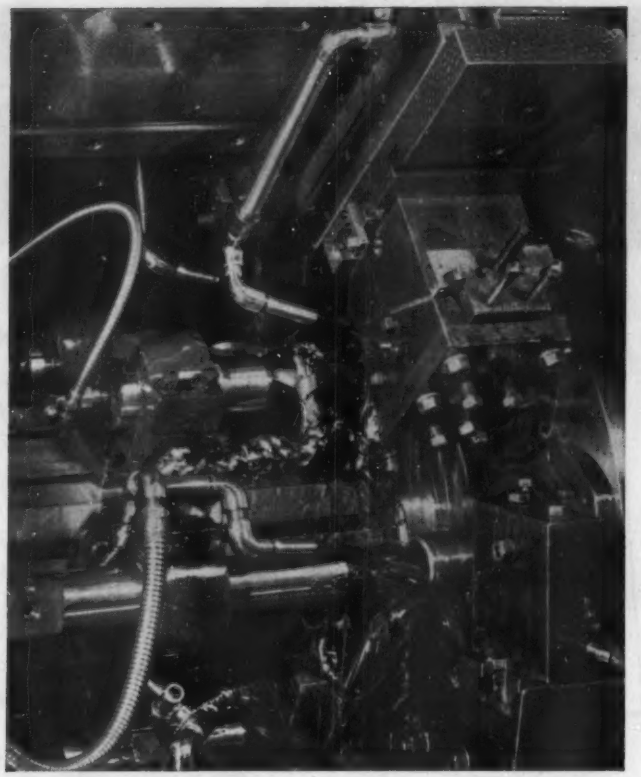

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HERE...

The field metallurgist comes right into your plant. He talks to your production and engineering people, asks questions, finds out what you want your cold drawn steels to do. He takes this data to . . .

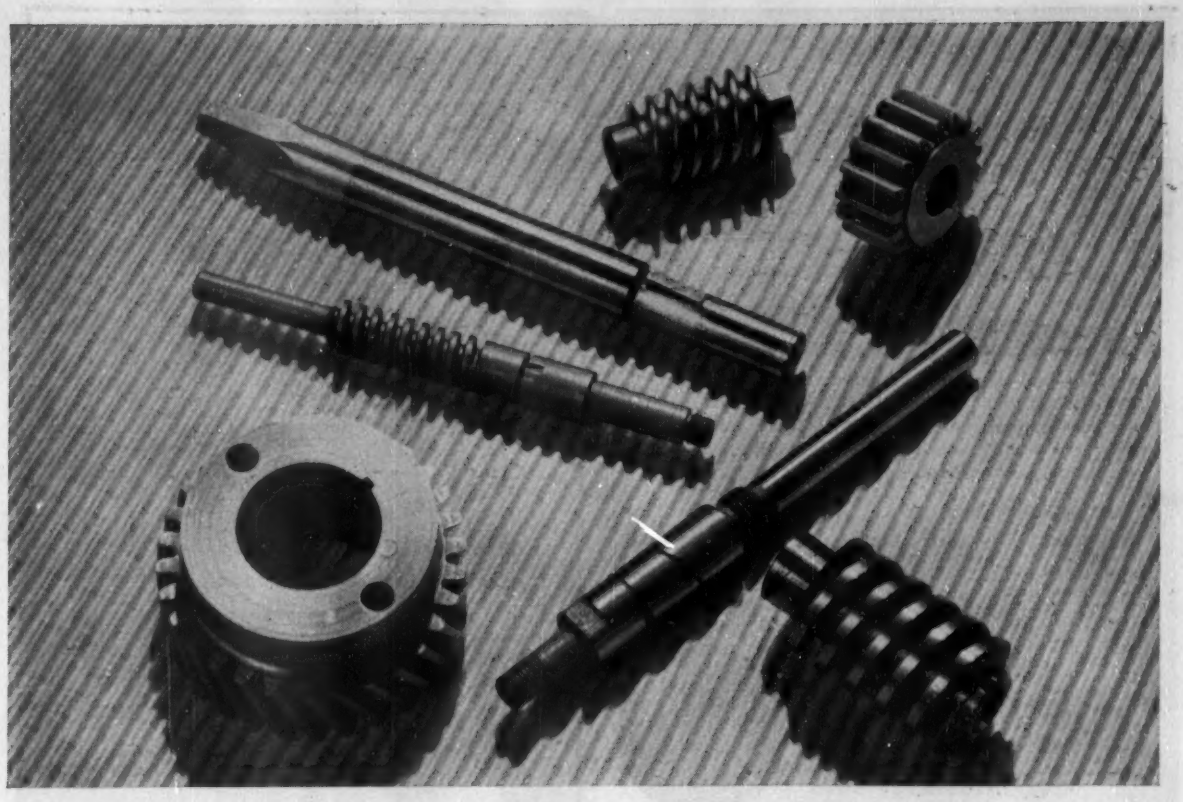
HERE...

A Republic Mill Metallurgist. He adds his knowledge to the report, checks it against your problem. Then, to make the report complete, a Republic Laboratory Metallurgist . . .

AND HERE...

Adds his years of experience in testing cold drawn steels. All three men put their heads together and come up with the solution to your problem.

Free-Machining Bessemer, Alloy and Enduro Stainless Steels • Union
Union Cold Drawn and Ground Rounds, Turned and Polished Rounds, Turned,



MEANS LOWER UNIT COST HERE

And we have the facts to prove it.

The proof starts in our own plant, on our own automatics, where we pre-test the machinability of Republic Cold Drawn Steel.

More proof comes from our customers—from our field metallurgists and machining specialists working closely with our customers.

The result: (1) top ratings you need on feeds and speeds; (2) long tool life; (3) improved surface finish; (4) freedom from abrasive elements; (5) high product quality.

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Now is the time to put the MACHINABILITY of Republic Union Cold Drawn Steels to work in your plant. Our metallurgists and machine tool specialists are ready to help you work out quick, economical solutions to your metallurgical and machining problems.

Contact your Union Drawn Distributor or your nearest Republic District Sales Office.

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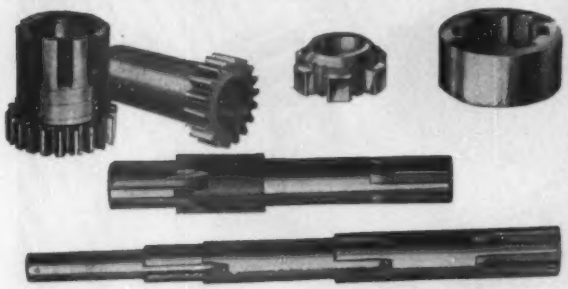
REPUBLIC *Union* COLD DRAWN STEELS

REPUBLIC STEEL

Cold Drawn Special Sections
Ground and Polished Rounds

If you use GEARS...



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ESTABLISHED 1883

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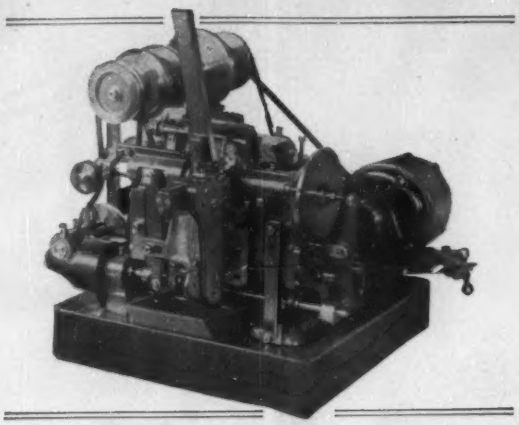
PINION AND GEAR CUTTING MACHINES



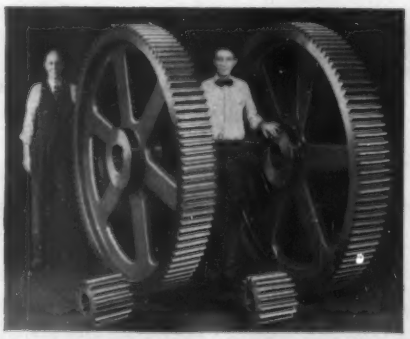
Fast, Convenient, Compact, Accurate

Designed to make high speed production of small gears and pinions available for assembly in watches, instruments, gauges, fuses, etc. Made in Single-Cut, Multiple Cut and Magazine-Feed types. Simple to operate; require no special skill.

Send for detailed information and complete specifications.

WALTHAM MACHINE WORKS
High Street, Waltham, Mass.

86 Years of KNOW-HOW!



Know-How acquired through 86 years of on-the-job experience, is responsible in great measure for the perfection embodied in these flywheel-type, punch press gears with pinions produced for the automobile industry.

G. F. Stahl has amassed the impressive total of 56 years on the job—and son J. F. Stahl augments that with 30 years of his own. This practical, progressive experience, working in close co-operation with a highly skilled, productive force of men and machines, is your guarantee for gears that are made right, fit right and last far longer. You'll be happy, too, with Stahl's prompt deliveries. Send for estimate.

SPURS TO 72" PD, 1 DP
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HIGH QUALITY
spiral bevel gears

- Heat treated and lapped in matched sets for high speed operation.
- Pitch diameter 2.5" to 14"
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- Production lots only
- Submit prints for estimates

AMARILLO GEAR WORKS
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HARDNESS TESTER

The *Scleroscope* is the only hardness tester that takes in the entire range from the softest to the hardest metals without any adjustments.

MODEL D-1 DIAL TYPE

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He makes sales go up in a downpour

"Women, weather and fashion are fickle," says Milton Kaufman. "Put 'em together and you have our business—all-weather garments.

"When a town is hit by heavy rain – especially without warning – the demand for Aquatogs shoots up.

"We call on Air Express, ship and deliver in a matter of hours—and cash in on this peak demand. As you might guess, our customers are flattered by this service.

"We regularly send orders out Air Express every week in the year throughout the country.

"We also depend on Air Express to move goods without a hitch from our door to the retail store receiving room.

"Yet, practically all of our orders cost us less with Air Express than with other air services."

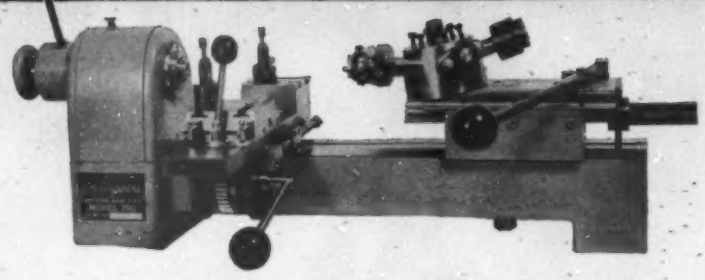
It pays to express yourself clearly. Say Air Express! Division of Railway Express Agency.

Air Express

GETS THERE FIRST *via U.S. Scheduled Airlines*

CALL AIR EXPRESS . . . *division of* RAILWAY EXPRESS AGENCY

DERBYSHIRE PRECISION LATHE *Model 750*



Lathe, 22" bed, Ball Bearing Headstock with Lever-Collet Closer, Pt. #3804, with Double Compound Slide Rest, Pt. #3652 and Six-position, self-indexing and semi-automatic Turret, Pt. #3610.

SPECIFICATIONS

Overall Length With Lever Chuck Closer	25"
Length of Bed	22"
Height to Top of Headstock	8½"
Height to Top of Lathe Bed	4"
Width of Bed	2⅞"
Width of Ways	1-13/16"
Swing over Bed	5.905" (15 cm)
Swing over Compound Slide Rest	2⅝"
Distance between Centers	12"
Center Height	2.953" (7.50 cm)
Maximum Collet Capacity	.315 (5/16")-(#80 metric)
Maximum Spindle Speed	18,000 RPM
Concentric Running of Ball Bearing Headstock Spindle	.0002"
Spindle Speeds with Variable Speed Drive:	
With Pulley Ratio 1 to 1	600 to 5,000 RPM
With Pulley Ratio 2 to 1	1200 to 10,000 RPM

Delivery from Stock

For full details write:

F. W. DERBYSHIRE, INC.

157 HIGH STREET • WALTHAM, MASS.

PRECISION PRODUCTION at GRAFLEX

At Graflex, Inc., in Rochester, N.Y., operators inspect their own work and get paid for it, and foremen have full freedom of action. These are just two important characteristics of the organization of the camera and precision-equipment manufacturer bearing this familiar name.

This *American Machinist* Special Report by Executive Editor E. J. Tangerman describes production methods at Graflex in detail. Over fifty photographs and other illustrations add to the value of the twenty-page report.

20 pages — — — 25 cents per copy

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Atlantic

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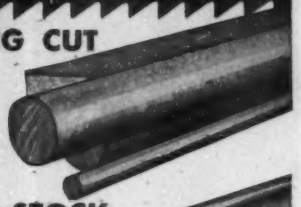
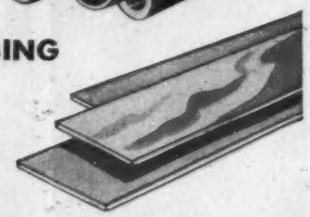
GANG CUT



BAR STOCK

TUBING



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IN LESS TIME!

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Brewery Street New Haven, Conn.

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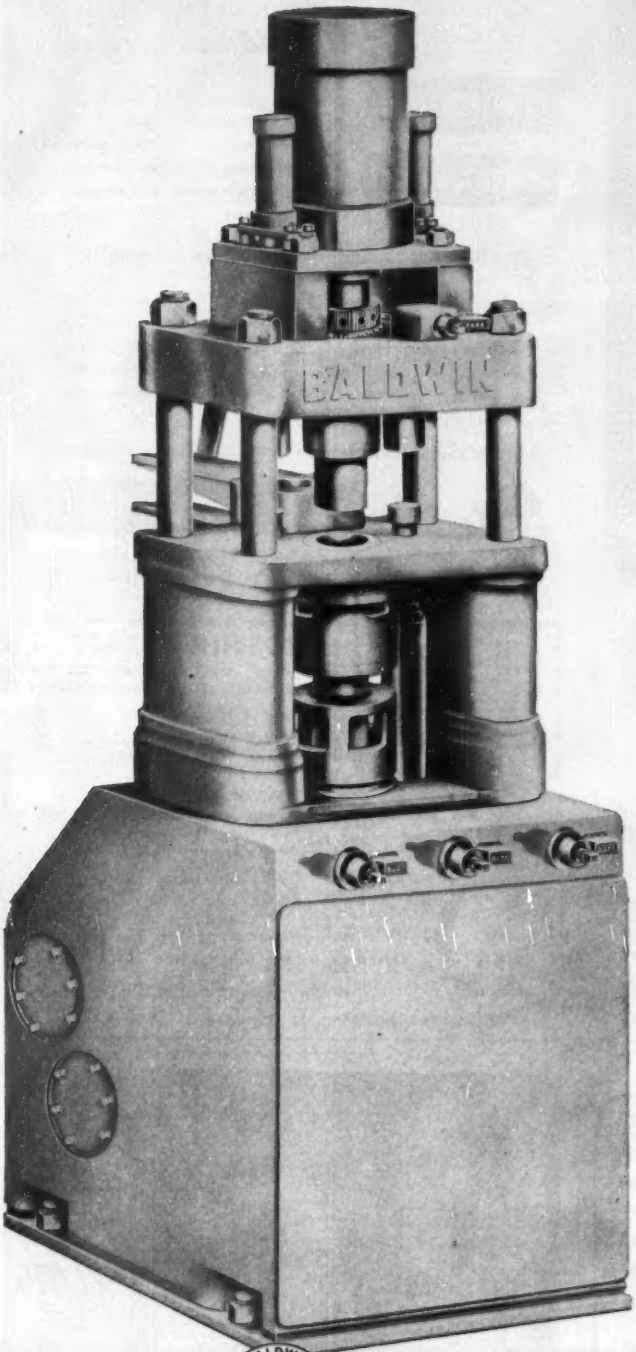
50-ton powdered metal press offers you 8 exclusive features:



1. Hydraulic Head prevents overloading and prolongs the life of tools and press by controlling accurately the applied pressure.

2. Floating Die Holder and core rod float independently of each other against pneumatic cushions. The distance of movement is controlled by positive adjustable stops.

3. Fill Adjustment. Two separate controls adjust the depth of fill and stroke of the bottom punch.

4. Pre-Pressing Die Position Control maintains flange thickness, obtains uniform density and eliminates weld line when section changes.

5. Shuttle Type Feeder, air operated and cam controlled, carries the same volume of material over the die cavity each time. Spring loaded cutoff ring prevents loss of material.

6. Automatic Lubrication. All moving lubricated parts are completely enclosed and sealed so that abrasive material can not get into the bearings. All bearings subject to load are pressure lubricated. The press will not operate if there is no oil pressure in the lubricating system.

7. Variable Cycling with five options, as follows:

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Semi-continuous run with dwell—stop at any predetermined point—dwell—start automatically. Dwell time is adjustable.

Single stroke—stop at any predetermined point—restart when operator pushes start button.

Single stroke with dwell—combination of two preceding steps.

Inching.

8. Quick, Accurate Adjustment permits changes in density or weight *while the press is in operation.*

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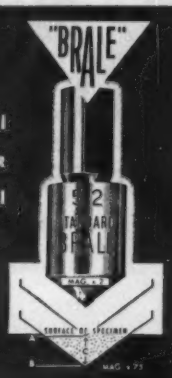

HOW IT WORKS

A. Minor Load Penetration
B. Major Load Penetration
C. Linear measurement of penetration increase which "ROCKWELL"* converts to hardness reading.

BRALE Penetrator Accuracy Is Proved in Wilson's Standardizing Laboratory

One point of hardness on the Rockwell C scale equals .00008", so penetrator accuracy must be constant. That's why Wilson maintains its Standardizing Laboratory for testing and approving every BRALE penetrator.

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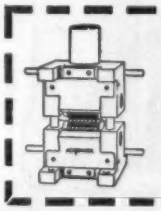

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For fast, free machining

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Youngstown

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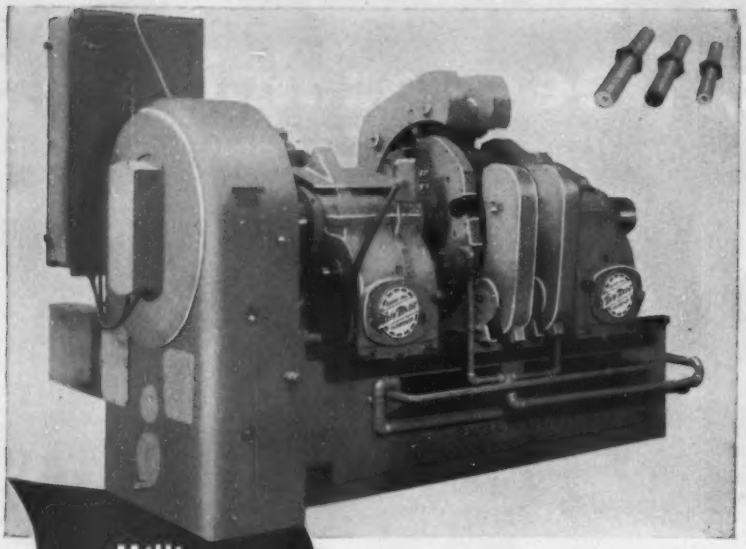

Milling and Centering Simultaneously and in Continuous Production

Here's an excellent example of how two entirely different operations can be combined on one machine. This Davis and Thompson continuous type Roto-Matic both mills and centers on both ends in one operation. Rough and finish milling cuts on the ends of the shaft and centering of both ends is completed with only one rotation of the fixture drum. The centering heads travel with the work station until centering operation is complete then drop back to next work station and repeat. Automatic equalizing clamping is provided to the fixture. Spindles have micrometric adjustment and spindle carriers are adjustable on the ways to accommodate shafts of various lengths.

FREE DATA on this and other Davis and Thompson machines is available in our bulletin No. 1000.

Roto-Matic

Davis and Thompson Co.

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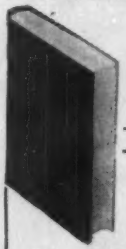
RUNNING A MACHINE SHOP

Practical manual gives owners and managers, foremen and shopmen, in large and small shops, many valuable management pointers for more efficient and profitable operation. Covers everything from shop layout to inspection methods—how to equip the shop, how to route and handle work, how to estimate, how to train workers, etc.



By Fred H. Colvin, Editor Emeritus, American Machinist, and Frank A. Stanley, Editor, Western Machinery & Steel World. 2nd Ed. 521 pp., 146 illus., $7.50

PUNCHES AND DIES

Here is a complete manual on every phase of punch and die work. Explains fundamentals, shows how to lay out, construct, and use punches and dies for specific jobs—according to standard practice of leading shops. Covers development of die design, use of metal stampings—data on sectional dies and big press work—blanking, notching, drawing, binding, forming, etc. **By F. A. Stanley. 4th Ed., 583 pp., 731 illus., $6.75**

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Here's the on-the-job help you need to make quick, reliable estimates of the time it takes to do the different machining operations in any machine shop—large or small. Describes every operation from drilling and boring to threading and grinding . . . every step from setting up a job to tearing it down—giving the specific time value for each element of the work. **By W. A. Nordhoff, Douglas Aircraft Corp. 486 pp., 419 illus., $7.00**

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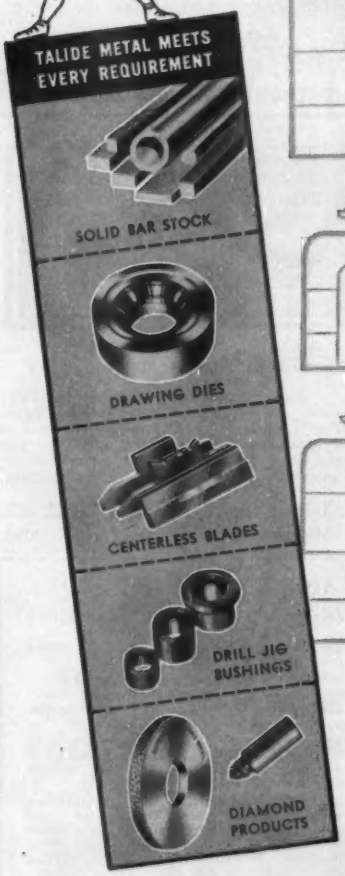

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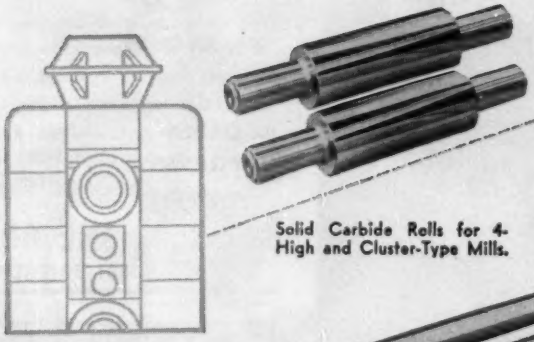
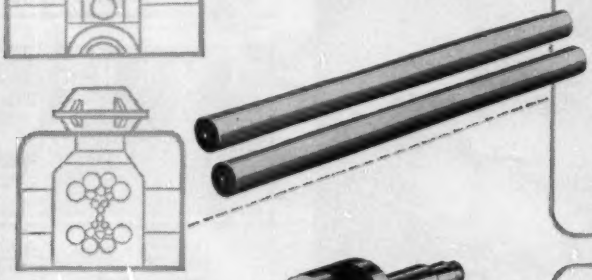
Metal Carbides Corp., Youngstown 7, Ohio



Solid Carbide Rolls for 4-High and Cluster-Type Mills.

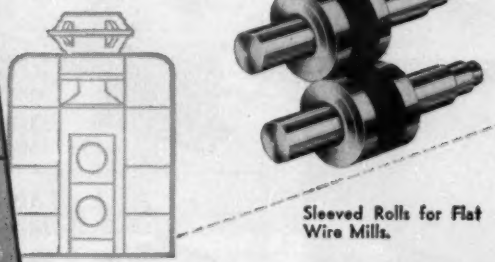
1600 to 20 coils

LARGE PITTSBURGH STRIP STEEL PRODUCER reports rolling 1600 coils of low carbon, high carbon, stainless and alloy steel strip with Talide rolls before same needed regrinding. Best previous service life obtained with steel rolls averaged between 16 and 20 coils.



168 to 7 hours

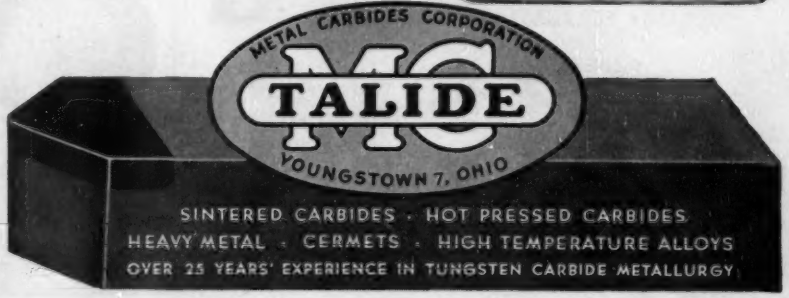
LEADING OHIO STRIP STEEL PRODUCER averages 750 coils of various types and analysis between grinds, enabling them to operate their cold rolling mill continuously without roll changes for 7 days, 3 turns per day. Previous steel rolls used averaged 6-8 hours, necessitating 3 or 4 roll changes per day with considerable down-time.



Sleeved Rolls for Flat Wire Mills.

50 to 2 coils

LARGE STEEL PRODUCER of straight chrome and nickel-chrome stainless steel strip now operates continuously for 3 turns or more with Talide rolls, whereas with steel rolls it was necessary to change 7 or 8 pair per turn. 50 coils are now rolled per regrind compared to 2 coils with steel rolls.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An IDLE man at a BUSY automatic spells PROFIT. ¶ A BUSY man at an IDLE machine spells LOSS. ¶¶ ¶ H&G Insert Chaser Die Heads are preferred by screw machine engineers because they spell less down time, lower costs, cleaner, more accurate threads. ¶¶

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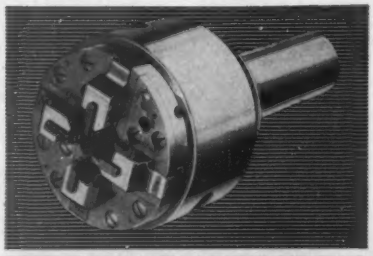
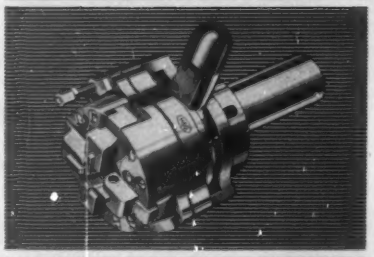
for multiple spindle automatics, chucking machines, drill presses.



Style DMS
for hand screw machines, turret lathes, where die head does not rotate.



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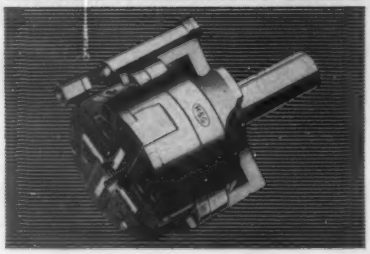
for B & S automatics and small spindle machines.



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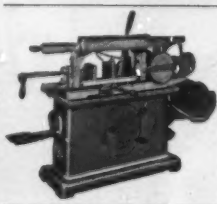

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Dial Gauges and Indicators

are accurate, reliable and built to stand hard usage.

Model "C 50 B" has a 2¼" overall diameter, balanced dial 0-25-0 with .0005" graduations, ⅛" range and movable dial easily set at zero.

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This style instrument can be furnished with various dials, graduations and ranges, in both English and Metric. There is a R. & S. Gauge for practically every purpose. Write for circulars describing our complete line.

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"HANNIFIN HAS THEM FROM 1 TO 10 TONS FOR PROMPT DELIVERY!"

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select the press you need from this chart...

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MODEL NUMBER	F-10	F-20	F-50	F-80	F-101
RAM SPEED (in.-min.) Down	400	190	120*	73*	130
RAM SPEED (in.-min.) Up	800	345	240*	151*	254
PUMP (gpm.)	3.3	3.3	5*	5*	11
MOTOR (hp)	1½	1½	2*	2*	5
STROKE (in.)	6	6	10	10	12
GAP (in.)	10	10	16	16	22
REACH (in.)	6	6	7½	7½	10
BULLETIN	H-784	H-784	135	135	134

Supplied with larger motor and pump when higher ram speed is required.

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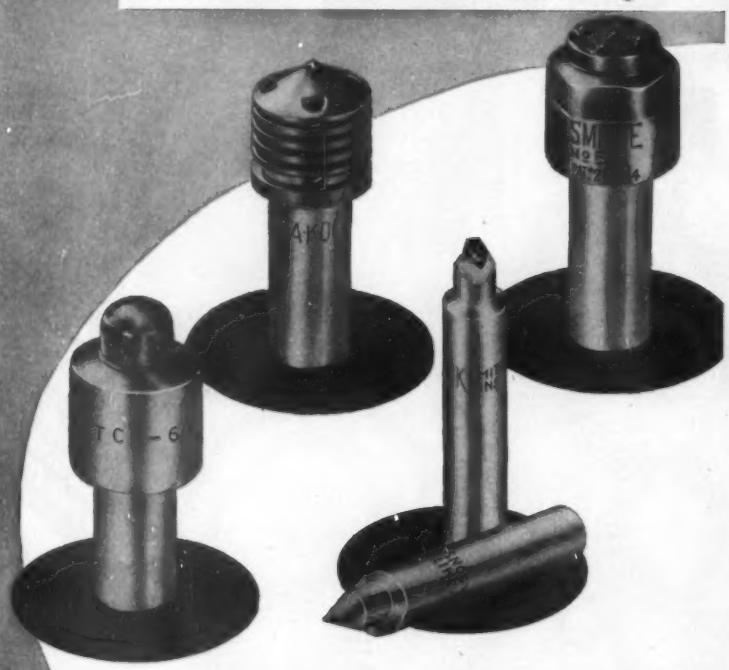


Send for your copy of our Tool Catalog or perhaps you may wish to consult our engineering staff for assistance on *your* Diamond Tool problem.

J. K. SMIT & SONS, INC.

Murray Hill, N. J.

$90,000 per year SAVED

By a $130,000 Investment In New Machinery

A company near New York City recently replaced 16 old machines with six multi-spindle automatics, an investment of $130,000. Savings in floor space, materials handling, and in cam storage and direct and indirect labor, total $90,000 per year. That's just one of hundreds of examples in the 1954 PRODUCTION PLANBOOK for Metalworking showing how thousands of dollars can be saved through wise replacement of obsolete machinery and equipment.

In today's increasingly competitive Metalworking Industry, modern production machinery, with its many great improvements, actually makes it *uneconomical* to operate production equipment ten years of age or older.

Your 1954 PLANBOOK, which you received in November as part of your *American Machinist* subscription, contains more pertinent, up-to-the-minute data on replacement and modernization than you can obtain from any other single source. A brand new *American Machinist* Inventory of Metalworking Production Equipment is featured, revealing complete figures on how much metalworking equipment of all types is in use in the U.S., where it is, and how old it is. In addition, the PLANBOOK has comprehensive sections on the replacement of major types of machines and equipment, and hundreds of actual case histories of what can *and has* been done through efficient modernization.

if you want lower V-Belt costs—

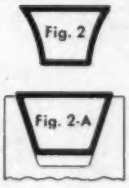
When a V-Belt bends, you can feel its sides change shape.

just make this simple test

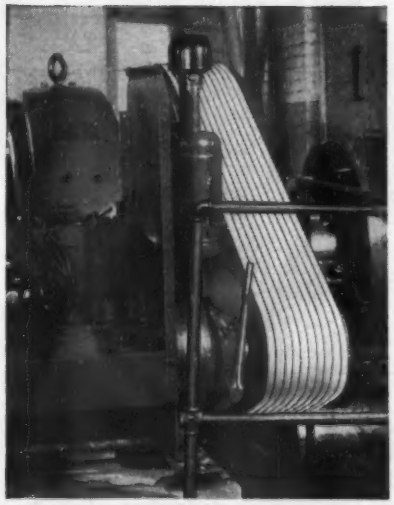
Take *any* V-belt that has *straight* sides (Fig. 1). Bend that V-belt while you grip its sides with your fingers. You will *feel* the sides *bulge out* (Fig. 1-A). Clearly, that out-bulge forces the belt to press *unevenly* against the V-pulley—and this *concentrates* wear at the points shown by arrows (Fig. 1-A).

Now bend a Gates Vulco Rope with CONCAVE SIDES (Fig. 2)

(U.S. PAT. NO. 1813698)



Instead of *bulging,* the precisely engineered CONCAVE SIDES merely *fill out* and become perfectly straight. This belt, when bent, *precisely fits* its sheave groove (Fig. 2-A). The sides of the Gates Vulco Rope press *evenly* against the V-pulley. Therefore, wear is distributed *uniformly* across the *full face* of this belt —resulting in *longer* belt life and *lower* belt *costs* for you!



Typical Gates Vulco Rope Drive —the Gates V-Belts are built with Concave Sides to insure longer belt wear.

When you buy V-belts, be sure to get the V-belt with the Concave Sides—the Gates Vulco Rope!

Gates VULCO ROPE DRIVES

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CS-543

OPPOSED HOLES
Drilled and Reamed In Line

•

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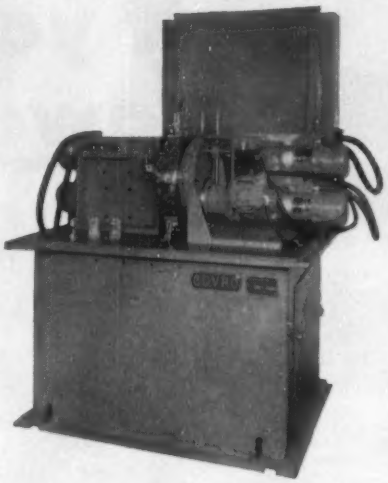

If you have similar operations and would like to speed up your production rate, send samples and part prints and we shall be pleased to recommend the proper Automatic Units or quote on a complete set-up. *Literature sent upon request.*

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SPECIFICATIONS

Model	Size	Tool Capacity
P-60	0	1/8 to 3/16
P-61	1	3/16 to 3/8
P-62	2	1/4 to 1/2
P-64	4	5/16 to 5/8

Specify left or right hand offset

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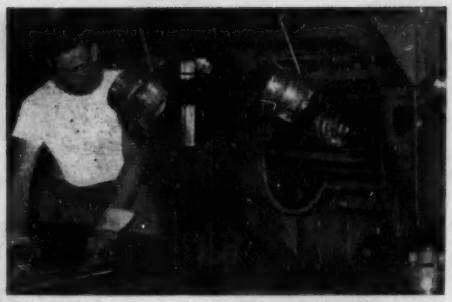
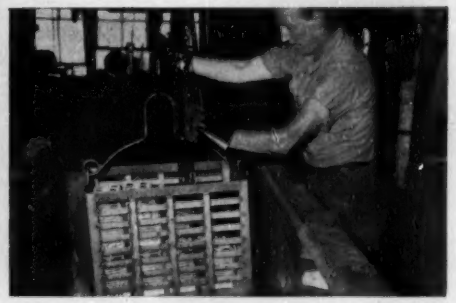


APPLIANCES. "Triclene" D swiftly cuts heavy oils and machining compounds from refrigerator compressor blocks. This rugged solvent is equally effective in conveyorized or manual degreasers.



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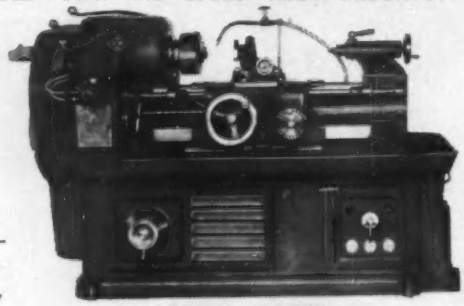

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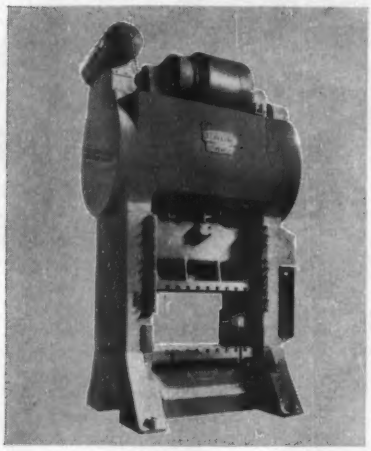

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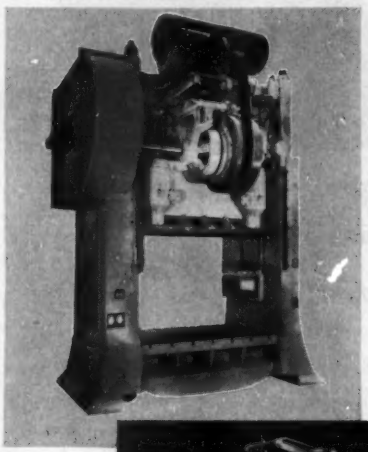

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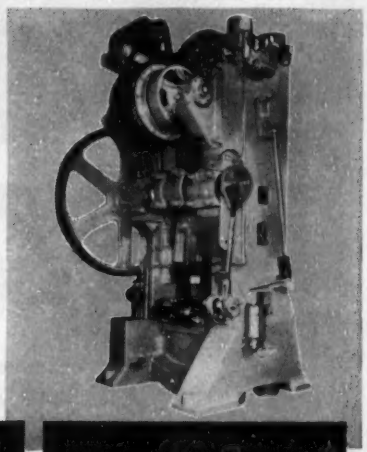

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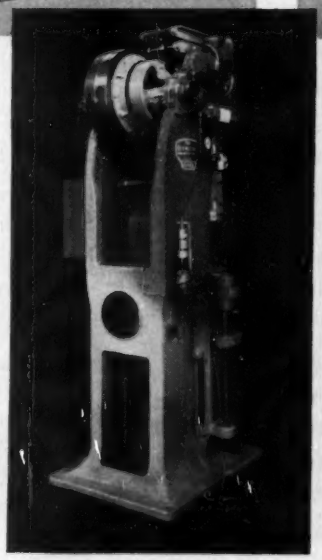

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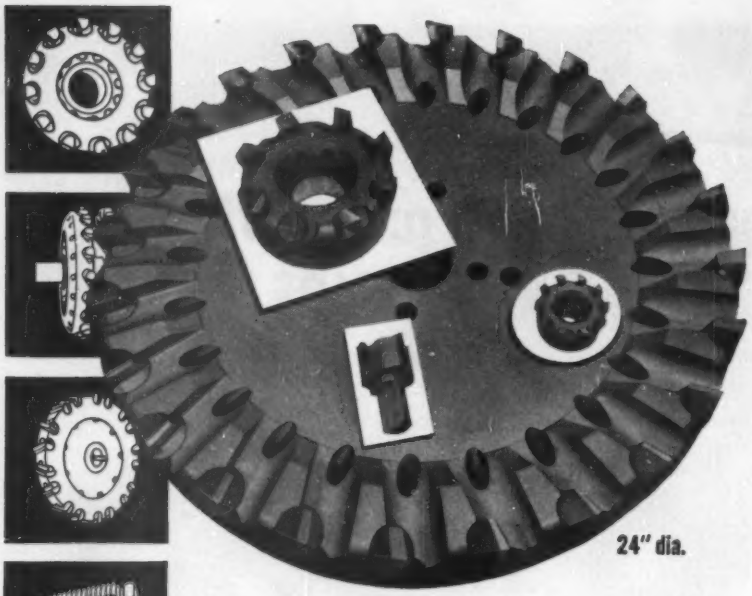

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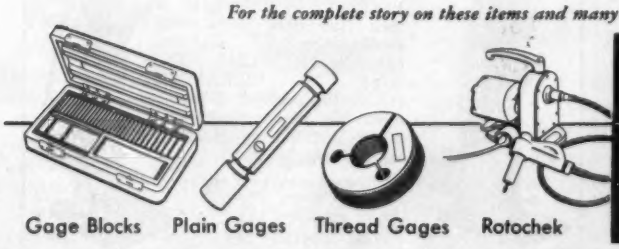

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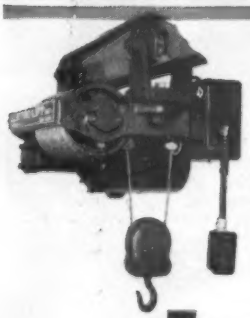

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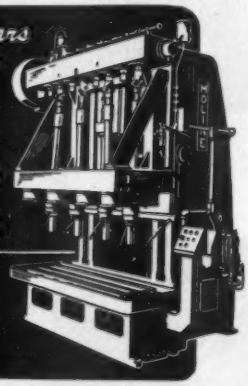

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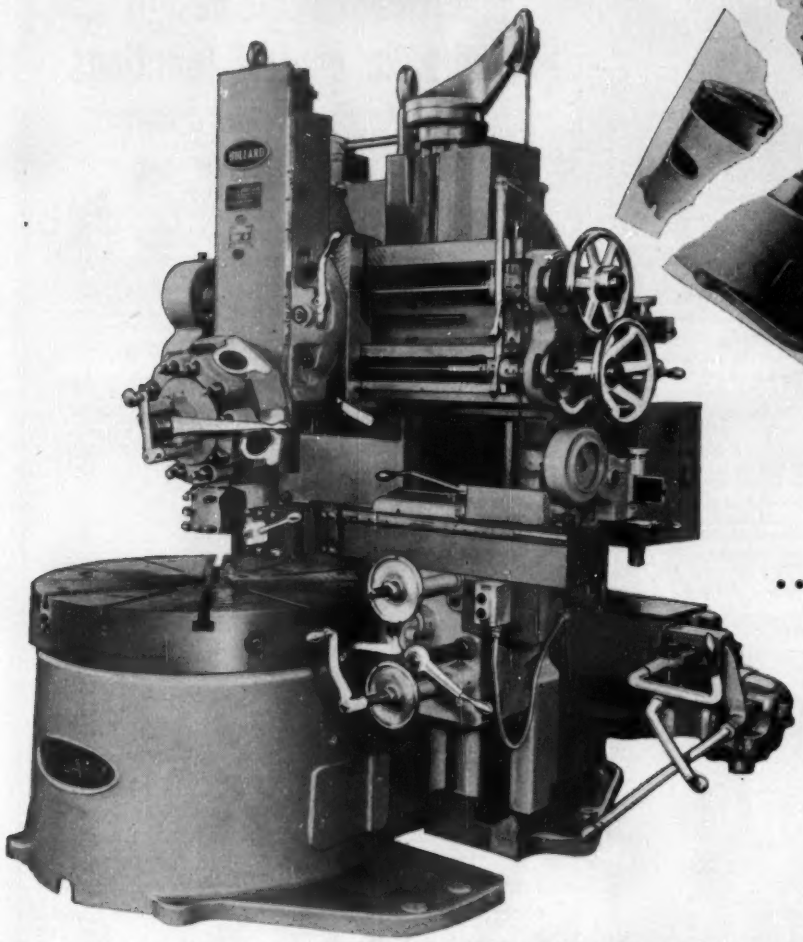

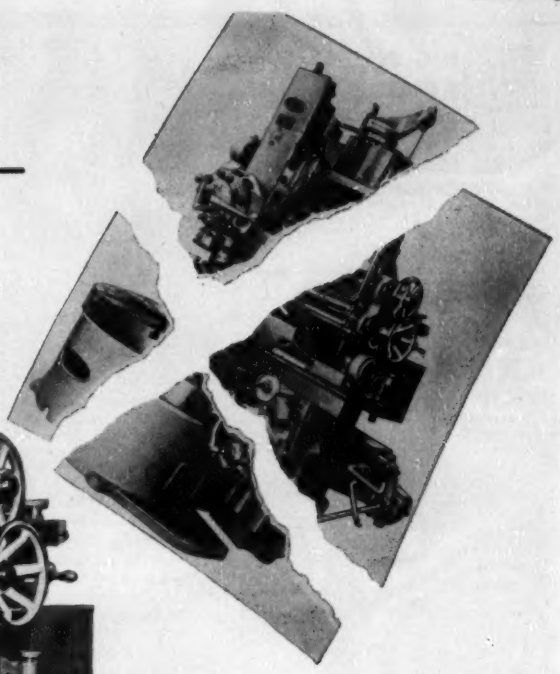

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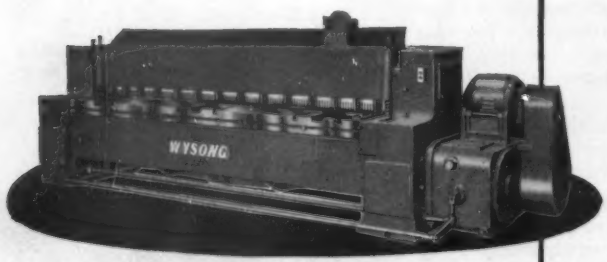

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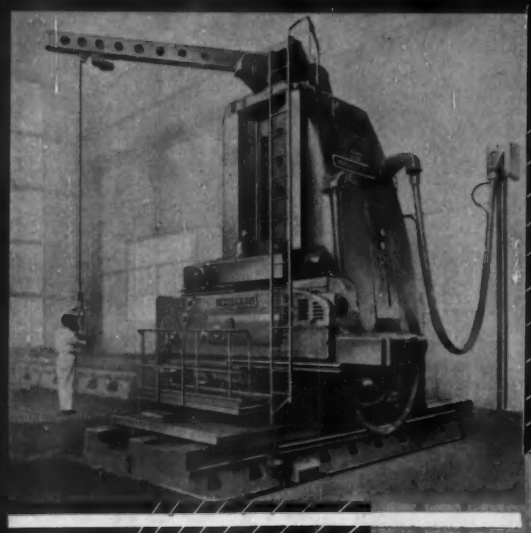

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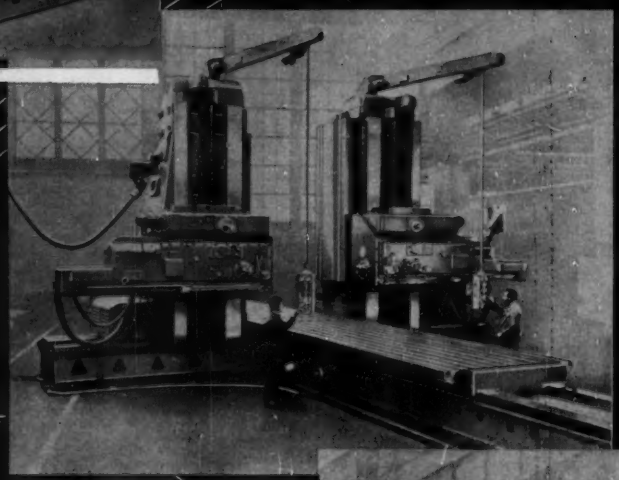

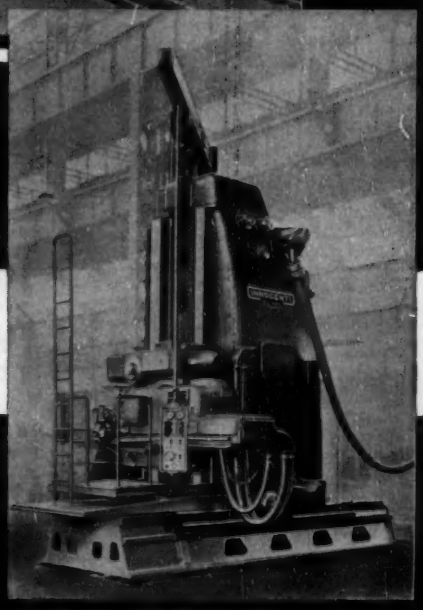

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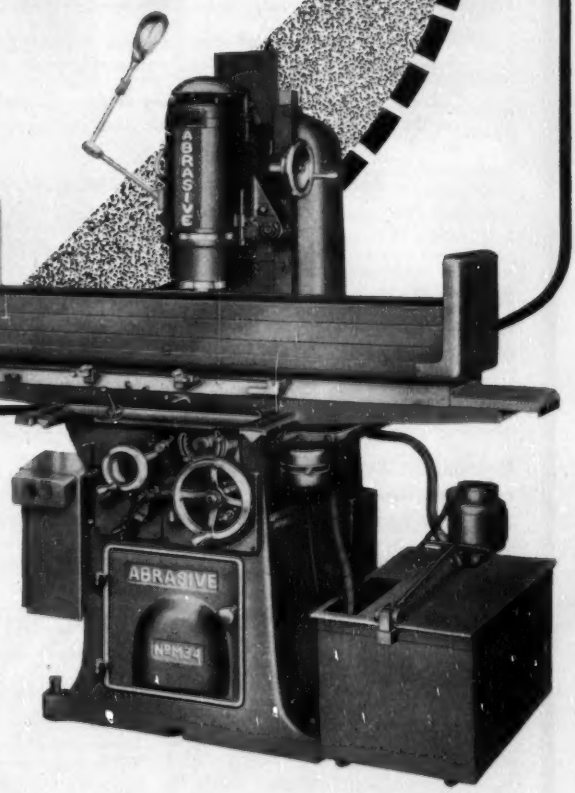

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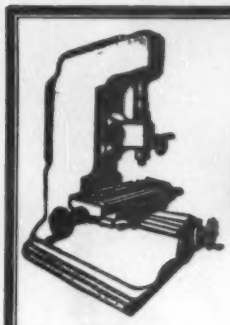

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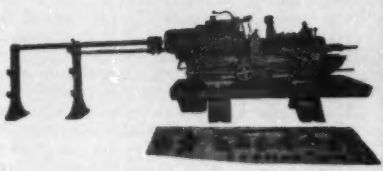

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No. 00G BROWN & SHARPE High Speed Automatic Screw Machine, Motor Driven, Late type.

No. 1 LaPOINTE Motor Driven Horizontal Broach, 5 tons cap., 38" stroke.

50 HP. CHICAGO PNEUMATIC Air Compressor. Type NSB, 253 CFM, Piston Displacement.

4'x15" Column CINCINNATI-BICKFORD "Super-Service" Radial Drill, Motor on arm, Box table.

No. 262 BARNES Motor Driven Sliding Head Drill Press. 2" cap. in steel.

No. 2 M.T. Six Spindle ALLEN Type KH Drill Press, Individual Motor Drive, Late Type.

6"x18" LANDIS Type "C" M.D. Hydraulic Cylindrical Grinder, Serial #29196.

6"x18" NORTON Vertical Hydraulic Surface Grinder, complete with magnetic chucks, coolant systems, Late Model.

#TG615 JONES & LAMSON Thread Grinder, Late, M.D. and TG848.

No. 208 BESLEY Motor Driven Disc Grinder, 26" wheels, Late Type.

No. 8LS FELLOWS M.D. Gear Lapping Machine. With Detachable Head, Universal Work Support.

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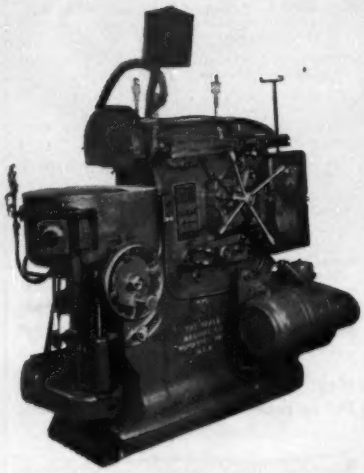
30 K.W. LEPEL High Frequency Induction Heater.

16"x54" centers AMERICAN Pacemaker Lathe, Taper Attachment, Late Model.



No. 22 HEALD MOTOR DRIVEN ROTARY SURFACE GRINDER. 12" Magnetic Chuck. Late Model.

20"/27¾"x14' AXELSON Lathe, 115" centers, Taper Attachment, Late.

24"x12' BOYE & EMMES Timken Bearing, Geared Head, Lathe. Late Type.

27"x16' NILES, BEMENT, & POND Geared Head Lathe, 9' centers, M.D.

24", 36" BULLARD Vertical Turret Lathe, New Era, Turret Head, Side Head, Motor Driven.

No. 601 W.D. OSTER Motor Driven Turret Lathe, 1½" capacity, Late.

No. 2, No. 5 WARNER & SWASEY Geared Head Turret Lathes, Bar Feed, Motor Driven.

#2 KEMPSMITH Horiz. Maxi-Mill, Motor in base, Vert. Head.

#08 CINCINNATI Vert. Mill, Plain & Rotary Table Type.

#3B KEARNEY & TRECKER Vertical Milling Machine, Motor in base.

No. 0-8 CINCINNATI Rise & Fall Horiz. Mill, Late Model.

No. 3B KEARNEY & TRECKER Horiz. Mill, Double Overarm, Motor in base.

No. 2M CINCINNATI Universal Horizontal Mill, Full Equipment, M.D.

#M200 DEFIANCE Production Drilling Machine. 2" Cap. in Steel.
#5 M.T., Coolant System. Late Type. 26" Swing, 1942.

No. 5 FEDERAL Open Back Inclinable 4" stroke, Timken Bearing Flywheel, M.D.

600 ton NILES-BEMENT-POND Motor Driven Wheel Press, 86" between strain rods, 14' cap., 17" diam. ram.

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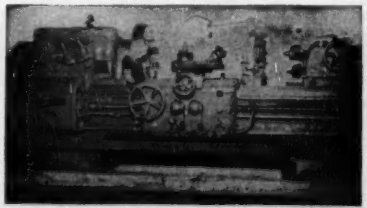
10'x10 ga., 10'x¼" WYSONG & MILES Power Squaring Shears, Motor Driven.

No. 20, WATERBURY FARREL Thread Roller, ⅜" cap., 1944.

#0, 1½ BUFFALO FORGE Universal Ironworker, Notcher, M.D.



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14¾"x10" Fay (Flanders)
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29"x37" Fay, serials 80851 & 80557.

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275 CFM 10"x10" Union horizontal enclosed
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3½' arm 8" column American sensitive radial
4' arm 13" column Carlton M1B radial, late type
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Type A Barber Colman universal
No. 12H Heavy Gould & Eberhardt universal
No. 36H Gould & Eberhardt
16" Cincinnati spur and spiral
8"-10" No. 1 Loos Bradner
No. 7B Loos Bradner
No. 3 Adams Farwell
72" S. & S. universal

GEAR MACHINERY MISC.

8" Red Ring Gear Shaver, two, late
8" Red Ring gear lapper
No. 60 Cross gear tooth rounder
Barnes "Mal" Hut O Lap gear lapper
National Cleveland gear checker
10" Pratt & Whitney hydraulic gear grinder
Nos. 71A, 75A, 712 and 715 Fellows high speed gear shapers
Illinois gear measuring machine
No. 343 Sheffield gear chamferer

GRINDERS

72" Hanchett rotary surface, new 1946
10"x36" Landis type DC, cyl. late, hydraulic
14"x36" Landis type C, cyl. hydraulic, late
16"x36" Norton type C, cyl. hydraulic, late
No. 2 Cincinnati centerless, plain and Filmatic bearing (Five)
10"x18" Cincinnati Filmatic bearing
10"x18", 10"x36" & 16"x72" Norton cylindrical
12"x36" Cincinnati universal cylindrical, serial 1U-3D-1D-5
16"/40"x96" Landis hydraulic cylindrical, gap type
No. 16A and 24-36 Bryant
No. 120A Gardner opposed spindle disc, 20"
23" No. 84 Gardner opposed spindle disc
53" No. 24A Gardner horizontal disc
30" No. 8 Badger double disc motor on spindle
No. 72A3 Heald plain hydraulic internal
No. 72A3 Heald Gagematic internal
No. 72A3 Heald Sizematic internal
No. 5 Bryant internal
5"x18" Norton vert. spindle hydraulic surface
8"x22" No. 3 Abrasive surface
12"x48" Model 300 Hanchett surface new 1946
No. 3 Barber Colman hob sharpener
10" Pratt & Whitney hydraulic gear new 1944.

LATHES

24"x14' bed American GH, QCG, serial 44070
12" Sundstrand Stub lathes (three)
No. 3A Warner & Swasey long bed universal T/L, late
H5 Libby International saddle type universal T/L, Late
Leonard hydraulic tube spinning lathe, new 1947
14"x42" Hendey CamLoc, timken, toolroom
14"x18" Lipe HS Carbe-lathe, new 1943
17"x8' LoBlond Mfg. timken, (three)
48"x32"x20'6" Niles-Bement-Pond engine lathe, like new

MILLING MACHINES

1-12 Cincinnati production miller
No. 2L Van Norman universal, vertical head, late
No. 3 Sundstrand Rigidmill production
12" Cincinnati plain manufacturing, also 18"
24"x24"x121 Ingersoll adjustable rail planer type mill mach., tracer controlled, new 1945
4—36 Cincinnati Hydromatic production
4—48 Cincinnati Hydromatic production
No. 2 Cincinnati high speed dial type plain
No. 1 Milwaukee vertical mill
No. 2B and 3K Milwaukee universal
No. 3B and 4K Kearney & Trecker plain

PRESSES

15 & 25 & 50 Ton Dennison hydraulic (4)
56 ton No. 304 Bliss, SS, solid frame, new 1942
56 Ton No. 23A Bliss OBI double crank, gap frame
60 ton No. 81 Cleveland, OBI (two)
88 ton No. 59-D-36 Cleveland, DC, steel frame
100 Ton No. 35P Toledo punching
106 ton No. 93D Toledo solid frame, DC
126 Ton No. 396 Bliss, SS, tiered frame
500 ton No. 1042 Verson, SS, all steel, air clutch, late model
650 ton No. DA 8411 Hamilton SS, toggle drawing

SHAPERS

6" P&W vertical slotter
16" American Heavy pattern Auto-oiled
24" Cincinnati Climax heavy duty
32" G & E shaper
36" Morton draw cut shaper
36" Rockford vertical hyd slotter, 1942

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American 42"x25' ctrs. Heavy Duty Geared Head Engine—16 speeds, range 2 to 150 RPM—MD

Monarch 36"x41' ctrs. Engine—16 speeds, range 2 to 101 RPM—MD

American 38"x13' ctrs. Geared Head Engine—12 speeds, range 9 to 400 RPM—MD—1943 machine

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Cincinnati 72"x54"x16' Hypro Planer Mill—Infinitely variable speeds—2 rail and 2 side heads—MD

Ingersoll Planer type—36"x36"x8'—3 heads—MD

Ingersoll Planer type—48"x48"x18'—3 heads—MD

Ingersoll Planer type—72"x60"20'—4 heads—MD

MILLERS

Milwaukee #3K Plain—Range 34"x12"x18"—Table 64"x14"—#50 taper—Speeds to 1500 RPM—MD—Late type

Cincinnati #4 Plain—Rectangular overarm—Timken bearings—#50 taper—Power rapid traverse—Vertical head—MD

Reed Prentice #3 Vertical Miller and Jig Borer—Range 48"x16"x15"—Table 16"x68"—18 speeds 17 to 800 RPM—MD

Cincinnati #4 High Power Vertical—#50 taper—Timken bearings—Speeds 17 to 400 RPM—MD

PLANERS

Rockford 24"x24"x60" Openside Hydraulic—1 head on rail—Late type

Gray Double Housing—36"x36"x32'—2 rail and 2 side heads—MD

Gray Double Housing—42"x42"x24'—2 rail and 2 side heads—MD

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Pratt & Whitney 12" Vertical Shaper — Rotary table 24" dia.—Motor in base

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United States District Court—Southern District of New York Bankruptcy Sale

Take Notice that pursuant to a plan of reorganization confirmed by order of the above-named Court dated May 4, 1954, the assets of Roller Gear Corporation will be sold free and clear of all claims and interests of said Corporation, its creditors and stockholders pursuant to the rules of that Court, first in lots then in bulk, at public auction conducted by Honorable Sylvester J. Ryan at Room 1306, United States Court House, Foley Square, New York City, on June 7, 1954 at 10:00 A.M. The assets to be sold include (1) furniture and fixtures, located at New Orleans, (2) 70% of the outstanding common stock of Scott Manufacturing Corp., a Louisiana corporation with a leased plant at New Orleans which manufactures machine parts and rehabilitates machinery, (3) demand promissory notes of Scott Manufacturing Corp. in the face amount of $50,500, secured by chattel mortgages upon Scott Manufacturing Corp. machinery, equipment and small tools, (4) loan receivable from an individual in the sum of $10,650 plus interest, (5) U. S. patents nos. 2559230 and 2586725, pending U. S. applications and corresponding patents and applications in 13 foreign manufacturing countries for a new type mechanically infinitely variable speed transmission together with jigs, tools and experimental gears related thereto.

Inspection of the notes; chattel mortgages; lists of furniture, fixtures, jigs, tools and experimental gears, and U.S. patents and pending patent applications may be had by attending at the offices of Roller Gear Corporation, 79 Wall Street, New York City on May 26, 27, or 28, between the hours of 10 A.M. and 4 P.M. or by appointment, and, inspection of the jigs, tools and experimental gears may be had by attending at the plant of Scott Manufacturing Corporation, 123 Lake Avenue, Southport, New Orleans on May 26, 27, or 28 between the hours of 10 A.M. and 4 P.M. or by appointment. Each bidder for substantially all of the assets must deposit $5,000 with the Trustee in cash or certified check as security for performance of bid. All bids payable in cash within 5 days except creditors of Roller Gear Corporation with proved and allowed claims who may redeem their bids to the extent of the pro rata value of their allowed claims and pay the balance of their bid in cash but not less than the amount of administration expenses as fixed by the Court.

BY ORDER OF THE COURT
Leo Kaplan
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24"x24"x6' G. A. Gray Planer, belted m.d., 1 head on cross rail
30"x30"x8' Cincinnati Double Housing, 2 rail heads
30"x30"x10' Cincinnati, belted m.d., 2 heads
30"x30"x10' G. A. Gray, belted m.d., 2 heads
36"x36"x8' Cincinnati, m.d., 2 heads on rail
36"x36"x10' Betts, belted m.d., 2 heads on rail, 2 side heads
36"x36"x10' Gray, Extra Heavy Pattern, m.d., 2 heads on rail
36"x36"x10' Niles-Bement-Pond, belted m.d., 1 head on cross rail
36"x36"x12' Betts, m.d., 2 heads
36"x36"x18' Niles-Bement-Pond, 2 heads, variable speed m.d.
36"x36"x20' Cincinnati, 2 heads, belt
36"x36"x20' Gray, 2 heads, belt
36' widened to 42"x36"x20' Cincinnati, m.d., 2 rail heads, 1 side head
42"x42"x14' Niles-Bement-Pond, reversing m.d., 2 rail heads, 1 side head
42"x42"x26' G. A. Gray, 2 heads, belted m.d.
48"x48"x18' Niles-Bement-Pond, 2 heads, belt
48"x48"x20' Cincinnati, reversing m.d., 4 heads
48"x48"x18' Detrick & Harvey, 4 heads, reversing m.d.
56"x42"x14' Cincinnati, belted m.d., 2 heads
72"x72"x36' Niles, 4 heads, reversing m.d.

SAWS

No. 4XB Robertson Economy Saw, m.d., new
No. 4B Robertson Economy Saw, m.d., new
Gustav Wagner Cold Saw, m.d.
Kalle Heavy Duty Steel & Metal Bandsaw, Model BSM-40, new
6x6" Racine Power Hack Saw, model 20
6x6" Peerless Hack Saw

RAILROAD MACHINERY

No. 2 Niles-Bement-Pond Double Head Axle Lathe, m.d.
No. 3 Niles-Bement-Pond Double Head Axle Lathe, m.d.
48" Niles-Bement-Pond Car Wheel Borer, m.d.
90" Niles Balanced Quartering & Crank Pin Turning Machine, latest
90" Putnam Driving Wheel Lathe, m.d.
90" Niles Journal Lathe, including 2 inside journal turrets and 3½" spindle double quartering attachment, m.d.
90" Niles Driving Wheel Lathe, m.d., latest
Niles-Bement-Pond Quartering Machine, m.d., new

SHAPERS

16" Hercules Shaper, m.d., new
24" Potter & Johnston, cone
20" American, m.d.
24" Gould & Eberhardt Crank Shaper, m.d.
32" Cincinnati H.D. Back Geared, cone, motorized
32" Morton Draw-Cut, m.d., late
36" Morton Draw-Cut, m.d., late

SLOTTERS

10" Newton, m.d.
10" Newton, cone
12" Bement-Miles, m.d.
15" Canada, m.d.
18" Dill, m.d.
18" Betts Crank Slotter, m.d.
18" Niles-Bement, s.p.d.
20-24" Dill, m.d.
22" Betts, m.d.
48" Niles, m.d.

TAPPERS

No. 1 Haskins, pneumatic control, type 1 CAP
No. 2 Haskins, pneumatic control, type 2 CAP
No. 3 Haskins, pneumatic control, type 3 CAP
Acme Semi-Automatic 6 spindle, 1½", arranged for m.d.
No. 3C Haskins, pneumatic control, type 3 CAM, m.d.
2 spindle Haskins, pneumatic control
No. 22 Murchey, 6 to 28 pitch

SHEET METAL MACHINERY

Doty Mfg. Co. 6' Pyramid Type Bending Rolls
No. 3 Ryerson Rotary Bevel Shear, 4" throat
Gray Turret Head Metal Cutter, cap. ¼", 36" throat
No. 2 Libert Nibbler, 28" throat
No. 3—⅝" cap. Gray Sheet Metal Cutter, m.d.
No. 336 cap. ⅜" W. J. Savage Co. Nibbler

TURRET LATHES & SCREW MACHINERY

No. 601 W. D. Ostar Geared Head Rapiduction, m.d. in leg, chucking
No. 1 Warner & Swasey "Electric", m.d., bar
No. 1A Warner & Swasey, m.d.
No. 1, 2 Cincinnati-Acme Full Universal, m.d.
No. 2A Warner & Swasey, m.d., bar
No. 2F Foster Fastermatic, m.d., Timken
No. 2G Morey, 1" cap., bar
No. 3 Cincinnati-Acme Full Universal, m.d., chucking
No. 3 Warner & Swasey, m.d.
No. 3 Foster Geared Head, m.d.
No. 3A Warner & Swasey, m.d.
No. 3F Foster Fastermatic, m.d., Timken
No. 4 Warner & Swasey, cone, bar and chucking types
No. 4 Warner & Swasey, preselector head, m.d.
No. 4A Warner & Swasey Universal, m.d., chucking
No. 4L Gisholt Universal, m.d.
No. 4FU Foster Fastermatic, m.d., latest
No. 5 Foster Universal Ram Type, m.d.
No. 5 Gisholt Full Universal, m.d., late type
No. 5 Warner & Swasey, m.d.
No. 7 Bardons & Oliver, m.d.
No. 7 Bardons & Oliver, cone
⅝" Pratt & Whitney Hand Screw Machine, cone, bar
2½x24", 3½x32", 4x34" Jones & Lamson Geared Head, m.d., bar & chucking
18" Libby Type A, m.d., chucking

IN ADDITION TO THE ABOVE, WE ALSO HAVE IN STOCK AUTOMATICS, BOLT THREADERS, HORIZONTAL & VERTICAL BORING MILLS, GEAR MACHINERY, GRINDERS, ENGINE LATHES, MFG. LATHES, MILLING MACHINES, PIPE MACHINES, PUNCHES & SHEARS, ETC.

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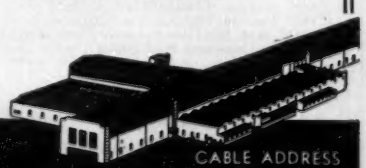

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AUTOMATICS

1-1/16" Cleveland Model A (1942).

BORING MACHINES

No. DB2112 Excello Single End Borer
100" Niles-B-Pond Vert. Bor. Mill.

DRILLS

No. 2 Avey Cam Fd. Drill. 14" Swing.
2 Spdl.—24" SW.—No. 3 Avey
No. 57H Fox 24 Spindle Multiple Drill (1943)

GEAR MACHINES

11" Gleason Gear Generator.
No. 12HS Gould & Eberhardt.
No. 36-BM G. & E.—3 spdl. Rougher.
615-A Fellows Gear Shaper.
612-A Fellows Gear Shaper.
No. 64 Fellows Gear Shaper.

GRINDERS

8"x30" Cam-o-matic (1946).
6"x18" Norton Type C Plain (1943).
10"x36" Norton Type C Grinder.
10"x36" Norton Type C Cam Grinder.
10"x48" Norton Type C Pl. (1943).
12"x36" Cinn. Universal Grinder
16"x25"x168" Norton Type C (1942)
TG 615 J & L Thrd Gdr.
B—24"-25" Chuck Arter Surf.
No. 1109 Bryant Internal Gdr. (1951).
No. 5 Bryant Internal Grinder.
No. 5B Bryant Internal Grdr.
No. 16-16 Bryant Int. Grinder.
No. 16-28 Bryant Int. Grinder.
No. 16 A-28 Bryant Internal Grinder.
No. 24-26 Bryant Int. Grinder.
No. 24-36 Bryant Internal Grinder.
No. 24L—36 Bryant Hyd. Internal Gdr.
No. 81 Heald Internal Centerless.
No. 2 MS—16"—2 spdl. Allen Drill

HILL-CLARKE NORTON TYPE MOTOR DRIVEN GRINDERS

10"x36" Centers. 14"x36" Centers.
10"x72" Centers. 14"x50" Centers.
10"x96" Centers. 14"x72" Centers.
18"x96" Centers. 14"x96" Centers.
18"-30" gap x 96" Centers.

HONES

Model H-2 Micromatic Horiz. Hone.
Model 200-H5-Dbl. End Micro. Horiz.
Model H-7 Micromatic Vert. Hone

LATHES

R-14 Lo-Swing Automatic Lathe.
18"x6' Am. Geared Head Lathe.
18"x8' Lodge & Shipley Grd. Hd.
27"x12' American Geared Hd. Lathe.
27"x12' centers LeBlond Lathe.
36"x18' Putnam Grd. Hd. M.D.
No. 5W Acme Tur. Lathe (Late).
No. 3AL Gisholt, Cross-Slide Turret.
No. 2 Warner & Swasey geared head turret
No. 4A Warney & Swasey Turret.
No. 6 Warner & Swasey, cone head, Turret.
2¼"x24" Jones & Lamson, turret.
1¾" Libby, M. D., turret.
No. 3 Warner & Swasey Bar Feed Tur.
No. 4A Warner & Swasey (1944).
No. 4A Warner & Swasey, Taper, Cross-sliding Turret (1942).

PLANERS

48"x36"x14' Gray, 2 Heads.
48"x48"x12' Cincinnati, 2 Heads.
60"x48"x27' American, 4 Heads.

MILLING MACHINES

No. 08 Cincinnati Vert. (1942).
No. 1-12 Cincinnati Pl. Auto.
4" Taylor & Fenn Duplex Spline.
10"x48" Hanson-Whitney Thrd. Mill.
10"x60" Pratt & Whitney Thrd. Mill.
12"x102" Mod. HT Lees Bradner Thrd. Mill.
54"x30"x16' Ingersoll Slab Mill.

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FINE LATE TYPE GUARANTEED TOOLS

16"x84" centers REED PRENTICE Model AA Toolroom Lathe, new 1944
28"x15' centers BERTRAM (Niles patterns) "Timesaver" Engine Lathe, 2 carriages, rapid traverse, AC-MD, new 1943
36"x12' centers AMERICAN Heavy Duty 18 Speed Geared Head Lathe, AC-MD
60"x20' NILES-BEMENT-POND Geared Head Engine Lathe, rapid traverse
No. 1L GISHOLT Saddle Type Universal Turret Lathe, preselector head, bar feed, chuck, new 1943
No. 1A WARNER & SWASEY Universal Turret Lathe, Timken spindle, electric chuck
No. 2A WARNER & SWASEY Universal Turret Lathe, preselector head, bar feed, chuck, new 1943
No. 3A WARNER & SWASEY Turret Lathe, Timken spindle, electric chuck, tooling
No. 3 WARNER & SWASEY Universal Turret Lathe, 800.000 series
No. 4 GISHOLT Turret Lathe, Timken spindle, hardened ways
No. 2 VAN NORMAN Plain Horizontal Mill. New 1943
No. 3-24 CINCINNATI Plain Hydromatic Mill, AC-MD
No. 4 CINCINNATI High Speed Dial Type Plain Horizontal Mill, new 1942
No. 4 CINCINNATI High Power Dial Type Vertical Mill, 25 HP motor, new 1951
No. 5 CINCINNATI High Power Vertical Mill, new 1951
48"x48"x10' NILES Double Housing Planer, box table, DC reversing motor drive.
48"x48"x12' Cincinnati Double Housing Planer, power rapid traverse, DC reversing motor drive, box table, forced feed lubrication.
48" widened to 69"x12' DETRICK & HARVEY Double Housing Planer, box table, DC reversing motor drive
1¼" LANDIS Belt Threader, leadscrews, AC-MD
30" MORTON Hydraulic Keyseater, new 1942
No. 8A MITTS & MERRILL Keyseater, capacity 0 to 4" width, 36" stroke, tooling
4' HAMMOND Jackknife Radial Drill, tapping attachment, new 1948
5'-13" column CARLTON Radial Drill, AC motor & gearbox on base
6'-17" column CINCINNATI BICKFORD Super Service Radial Drill, power rapid traverse, motor on arm
36" BULLARD High Speed, fine feed attachment, Vertical Boring Mill, rapid traverse, new 1942
42" BULLARD Spiral Drive Vertical Turret Lathe, extra high column
42" KING Vertical Boring Mill, 10HP AC motor, power rapid traverse.
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BORING MILLS, 42" King, Side Hd., New 1942
42" Bullard, Spiral Drive
72" King, P.R.T., M.D.
100" & 72" N.B.P., 2 hds., M.D.
3½" bar Defiance, Table (2)
4½" bar Sellers Floor Type
6" Bar Niles, Floor type
RADIAL DRILLS, 5'-13" col. Amer., Motor-on-Arm
4'-13" col. Cinci. Bickford, M.-on-arm
GRINDER, 16"x96" Landis Hyd., Late
24"x168" Cen. Norton "G", 1943.
LATHES, 48"x29' & 24' beds Niles (2)
14"x60" cen. Amer., T.A.
SLOTTERS, 20"-24" & 12" Dill-Lobdell
36" Rockford Hyd. 1942

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Whiting Circle Shear 3/8"x48" throat.
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FELLOWS: Flat Top Helical Gear Cutter Grinder
OLIVER: 10" Template Tool Bit

DRILLING MACHINES
ALLEN: No. 2 Drill—6 Spindle, 8" overhang
ALLEN: #2 High Speed 15"
BARNES: No. 210, 2-spindle, 21" Swing
PRATT & WHITNEY: ½B x 50 Deep Hole Drilling & Reaming Machine, 2-spindle
RADIAL DRILLS: Archdale, 5', 6' & 7', new

GEAR MACHINERY
FELLOWS: 61A & 64A Shaper, 18" dia.
FELLOWS: Flat Top Helical Gear Cutter Grinder
FELLOWS: Straight Line Generator, 3" dia. with many cutters
GLEASON: #12 Rough & Finish Gen.
SYKES: Rack Cutting Machine 12" to 36" length capacity (New)
PRATT & WHITNEY: Gear Grinder, 10" single and double wheel, hydraulic feed
GEAR GRIND MACH: GG-19, 10"x24" Hydr. Spur Gears and Splines
INTERNAL GEAR GRINDER, GG-31

GEAR TESTERS
FELLOWS: 8 LSI and 18 LSI Gear Lappers, external and internal spur and helical
FELLOWS: #12C Cone & Spacing Inspection Instrument
GLEASON: No. 3 Bevel Gear Tester
GLEASON No. 4 and No. 6 Bevel Gear Testers. Hand and Power
NATIONAL BROACH: SIC-12" Red Ring Gear Testing Machine

GEAR HOBBERS
CLEVELAND: #130 & 140 Rigidhobbers
REINECKER 60"
BROWN & SHARPE No. 44 20" cap.
SCHUCHARDT & SCHUTTE, 36" cap.
LEES-BRADNER 49A

GRINDERS—CYLINDRICAL
BROWN & SHARPE: No. 10 cap. 6"x18" plain
CINCINNATI, 6"x18" Hydraulic, Plain
LANDIS: 16x32" Type "D" Crankpin, hydraulic, for grinding crankshafts
NORTON: 12"x18" Type C, Universal
NORTON: 10"x36", 30 Deg. Angle Wheel
NORTON: 10"x18" 45° angle wheel

GRINDERS—GEAR & SPLINE
GEAR GRIND MACH.: GG-19, 10"x24" Hydr. Spur Gears and Splines
PRATT & WHITNEY: 10" single and double wheel, hydraulic feed
INTERNAL GEAR GRINDER, GG-31

GRINDERS—INTERNAL
BRYANT: #5, #16-16, #24-L-36
HEALD: #50 Planetary
HEALD: Model 72A3 & 72A5

GRINDERS—RADIUS
VAN NORMAN: #78, capacity 7½"
VAN NORMAN: #649-16, cap. 6" to 16" dia.
VAN NORMAN: #3½ Un. Radius

GRINDERS—THREAD
EXCELLO: #31 External, dia. 5"x18"

HONING MACHINES
BARNES: Model 224, 4" dia. x 16" stroke
BARNES: Model 172, 7" stroke.
MICROMATIC: H-510 Double End Horisontal, ¾" to 2" dia.
MICROMATIC: H-2 Single End Horizontal, 2 spindle, ¼" to 1" dia.

LAPPING MACHINES
FELLOWS: 8 LSI and 18 LSI Gear Lappers, external and internal spur and helical

LATHES—PRODUCTION
BLOUNT: Polishing speed lathe 12" dia. x 48" centers
LODGE & SHIPLEY: #3A Duomatic, 28½" swing x 27" centers

LATHES—TURRET
BULLARD: 36" Vertical turret
WARNER & SWASEY: #1A, #2A, #3, #3A, #4, #4A & #5

LATHES—TURRET—continued
HERBERT: #0, #2, #4, #7, #8 and #9B/20 Sizes, new
WEBSTER & BENNETT: Vert. 36" & 48" (New)

MILLING MACHINES
TAYLOR-FENN: M-80 Duplex Spline
RICE-BARTON: 4" Twin Spline
VAN NORMAN: 10CT Contour Miller, horizontal opposed spindle type for milling flat cams, also can be converted to similar work

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RUSSELL: 9¼" cut-off Saw with Auto. Stock Feed (New) Hydraulic
RUSSELL: 5½" dia. cut-off saws, auto stock feed, hydraulic (New)
MOTCH & MERRYWEATHER: No. 3 Circular Saw with auto. stock feed
MARVEL: No. 6 Hacksaw, 6"x6"

THREAD MILLERS & TAPPERS
HALL PLANETARY: Mod "D" Thread Miller
LANDIS: 2½" single head horiz. threading machine
LEES-BRADNER: #40A Thread Miller
LEES-BRADNER: CT-36 Thread Miller chucking type, 13¼" hole
MURCHEY: #22 Horizontal threading and tapping machine, ½" to ½" dia. capacity, single spindle

MISCELLANEOUS
MOLDING MACHINES, ROLLER JOLT: Osborne Model 2047-3
AUTOMATIC SCREW MACHINE, Wickman, Single Spindle, 7/16" New
RACK CUTTING MACHINE: Sykes 12" to 36" length capacity (New)
CUT-OFF: Russell 5½ & 9½" cut-off saws with auto. stock feed (new) hydraulic
TEST STAND: Denison 918-AM Hyd.
HARDNESS TESTER: Grogan Brinell, 16-8
SHEFFIELD Precisionaire Gauge
SUNDSTRAND: Double-End, #53, 42" & 60" Centering Mach.
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W & S No. 2-A Grd. Hd. Univ. Turret Lathe chucking.
Rivett No. 104 A.C. M.D. Internal Grinder.
Milwaukee Nos. 2-B & 3-B Horiz. Plain Millers D.O.
Cincinnati 30"x36"x10' D.H. Planer 2 Hds. Sq. Table.
Heald No. 72A-3 Hydr. Int. Grinder Red Head Sp.
LeBlond 27"x12' Red Grs. Hd. Q.C.G. Lathe 15" hollow spindle.
Cincinnati No. 2 Hi-Power S.P.D. Vert. Miller.
G & L 9" Bar Horiz. Boring Mill.
Barnes 20" All Grd. Camel Back Drill 1-Sp.
Blanchard M.D. Vert. Sp. Surf Grinder 24" chuck.
Campbell No. 218 abrasive cut off 1944.
Sundstrand 4-Sp. Vert. Rigidmill
Heald #22 Rot. Surf. Grinder 12" chuck 1942.
Landis 2-Sp. 2" Cap. Bolt Threader M.D.
Handey 16"x8' Red Q.C.G. Lathe 1939.
W & S No. 4 Ram Type Grd. Hd. Turret Lathe.
G & E 24" Gear Box Shaper Tilt. Table Tes.
Newton 42" Table 1-Sp. Cent. Vert. Miller.
Foster 2-F Fastermatic Hyd. Turret Lathe.
Kempsmith No. 2 Vertical Maximiller M.D.
Springfield Planer Type Surf. Grinder.
P & J #2 Auto. Prod. Miller, 2 Tables.
Foote-Burt #23 Bor. Col. 1-Sp. Hvy. Drill.
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LATE TYPE MACHINE TOOLS

48" Jungenthal Vertical Turret Lathe. New.
650 Ton Verson Double Action Eccentric Press 1940.
No. 41 Lucas Horizontal Boring Mill. 1941.
DB-215A Excello Double End Boromatic. 1945.
HP-100 LaPointe Horizontal Hydraulic Broach. 1945.
12" Gleason Gear Generator. 1942.
No. 7 Gleason "Revex" Gear Rougher. 1943.
16"x72" Norton Univ. Grinder. 1942
TG 6"x36" Jones & Lamson Thread Grinder. 1943.
No. 35 Excello Precision Thread Grinder.
24-36 Bryant Hydraulic Internal Grinder. 1942.
No. 72A3 Heald Plain Hydraulic Internal Grinder. 1941.
No. 24D Mattison (Hanchett Type) Duplex Grinder. 1945
No. 10 Sundstrand Automatic Lathe F & R Slides. 1942.
No. 6DRE Potter & Johnston Automatic. Late.
No. H5 Libby Universal Saddle Type Turret Lathe. 1939.
No. 3R Gisholt Universal Saddle Type Turret Lathe. 1942.
No. M-18 Kearney & Trecker Simplex Mill. 1943.

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No. 45 HEALD Boromatic, Single End, Two Spindle
16x20 MONARCH Model EE Toolmaker's Lathe
12x30" MONARCH Geared Head Lathes
30"x16' bed AMERICAN High Duty Geared Head Lathe
36"x17' AMERICAN Heavy Duty Geared Head Lathe, 1941
42"x15' AMERICAN Heavy Duty Lathe
42"x25' centers AMERICAN Heavy Duty Lathe
80"x18' LeBLOND Heavy Duty Geared Head Lathe New 1952.
Nos. 5A and 5Y BRYANT Internal Grinders
No. 18 BLANCHARD Vertical Rotary Surface Grinder
10x36 HILL CLARKE Plain Cylindrical Grinder
No. 172 HEALD Gap Internal Grinding Machine for large swing
10"x72" LANDIS Type C Hydraulic Plain Grinder —1942
24"x276" LANDIS Type B Hydraulic Pl. Grinder
42" BULLARD "Bairal Drive" Vert. Turret Lathe.
Nos. 4D and 6S POTTER & JOHNSTON Automatic Lathes.
1L GISHOLT Universal Turret Lathe. 1946.
No. 8A JONES & LAMSON Saddle Type Universal Heavy Duty Turret Lathes.
No. 2 CINCINNATI HS Dial Type Plain Millers.
No. 8-R CINCINNATI Plain Milling Machines.
No. 2M CINCINNATI Vertical Miller, 1941.
FITCHBURG Plain Horizontal Mfg. Type Milling Machine, 24"x72" table.
No. 1-18 CINCINNATI Plain Mfg. Miller.
No. 3M BROWN & SHARPE Dual Control Plain Miller
No. 5 CINCINNATI High Power Plain Miller with motorized overarm
E-5 & 2AL NATCO Multiple Spindle Drilling Machine
Nos. 64 and 72 FELLOWS High Speed Gear Shapers
No. 12 FELLOWS Gear Shaver, 1943.
No. 36BM GOULD & EBERHARDT Gear Rougher
16/20" GOULD & EBERHARDT Industrial Shaper
36" OHIO "DREADNAUGHT" H.D. Shaper
100" BETTS Vertical Boring Mill, 2 heads.
CINCINNATI BICKFORD Precision Drilling Machine with Bullard Man-au-Trol Table.

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ACME GRIDLEY R6, 1¾" 6-spindle; late type
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CONOMATIC 4⅝" 4-spindle; motor drive; late
CLEVELAND 3¾" Model "A" Single Spindle
CLEVELAND 8" Model "AA", single spindle, late
GYROMATIC Model 40, 2⅝" 6-spindle; late
NEW BRITAIN GRIDLEY Model 665; 6-spindle chucker; latest type; new 1943

BROACHES

COLONIAL VGI-10-48 Vertical, cap. 20,000 lbs.; 48" stroke, Hydraulic; late
LaPOINTE 10-54" Vertical, Model SRV, cap. 20,000 lbs.; 54" stroke; new 1947
OILGEAR 3XA Horizontal, cap. 20,000 lbs.; 58" stroke, Hydraulic; late

DRILLS

AMERICAN 4' arm 11" col. "Hole Wizard"; late
AMERICAN 5' arm 13" col. "Hole Wizard"; late
NATCO Model B4B arranged for 60 spindles, late
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GEAR EQUIPMENT

FELLOWS #6, 6IA, 7S H.S. Gear Shaper; late
GLEASON 12" Spiral Bev. Cutter Sharpener; M.D.
GLEASON 12" Straight Bevel Gear Generator
GLEASON 3" Spiral Gear Generator, late type
GLEASON #17 Spiral Bevel Hypoid Gear Grinder
GLEASON #24 Straight Bevel Gear Generator; late
GLEASON 24", 32" Bevel Gear Planer; late type
BARBER COLMAN Type "A" Gear Hobber; late
GOULD & EBERHARDT #12-H Gear Hobber; late
GOULD & EBERHARDT #120-H Double head universal

LATHES—Engine and Mfg.

DENHAM 16"x72" centers, Gap; late type
HENDEY 24"x36" centers, M.D., late type
LEHMANN 16"x30" Center, Timken, late type
LODGE & SHIPLEY 14"x30" Centers; late type
MONARCH 12"x30" Centers; Model CKK; late
MONARCH 14"x42" Centers; "2" Magnamatic, Automatic; Timken, M.D., late
NILES 30"x25' bed, Single End Boring, "Time Saver"; late type
NILES 50"x50' bed, Single End Boring, "Time Saver"; late type
PORTER-McLEOD 16"x6' Lathe; New
PRATT & WHITNEY 16"x30" ctrs.; Timken; late
REED PRENTICE 14"x54" ctrs., model "B", Timken late type
SPRINGFIELD 14"x43" geared; M.D.
SUNDSTRAND 16"x60" ctrs., Automatic; late
SWIFT 16"x72" centers; late type
U.S. Model 810B Cutter Reliever; 8" cap.; late

LATHES, Turret

BARDONS & OLIVER #5 Universal ram type; late
GISHOLT 1L Univ. Saddle type; Timken; M.D.;
GISHOLT 2L Univ. saddle type; Timken, M.D.,
GISHOLT #3 Univ. Ram Type; M.D., late
MOREY No. 2 ram type, Timken; latest type
MOREY No. 4 ram type; Full Univ.; latest type
WARNER & SWASEY #5 Univ. Ram type; M.D., late

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GRAY 36"x36"x10' "Maximum Service"; 4 heads, Power Rapid Traverse; D.C. Reversing; M.D.
GRAY 48"x48"x10' "Maximum Service"; 4 heads; Power Rapid Traverse; D.C. Reversing; M.D.
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WATERBURY FARREL No. 9, 125-ton cap. Blanking

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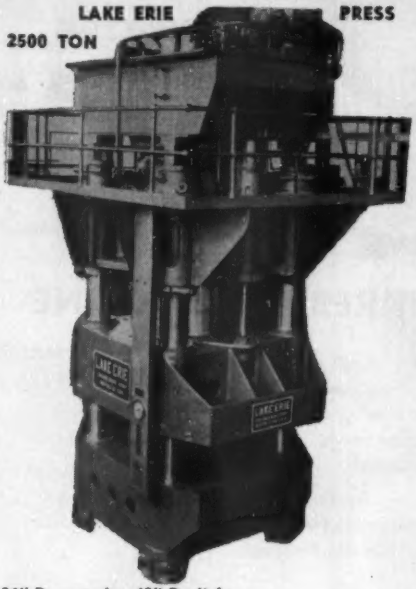

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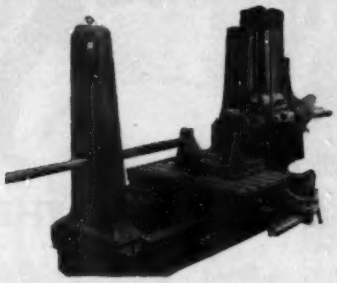

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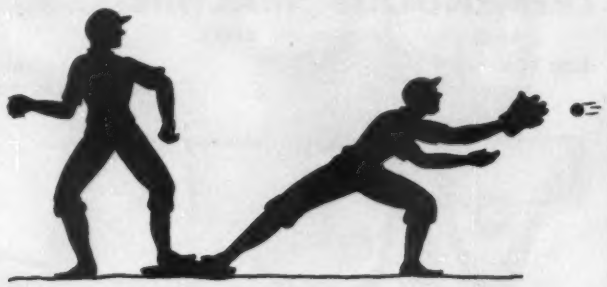

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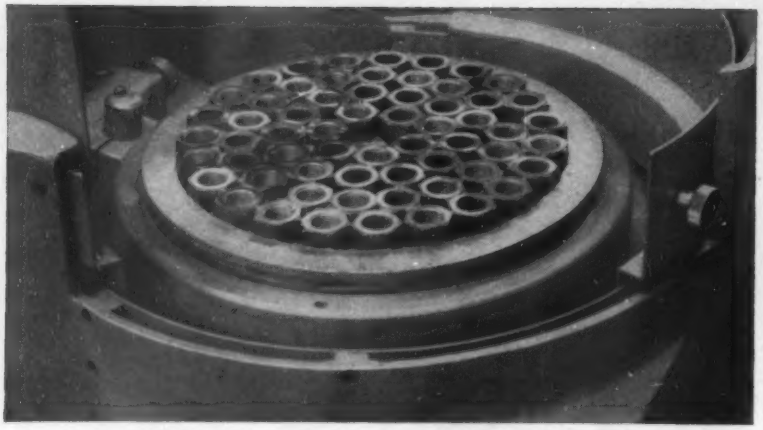

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CENTRIFUGE THESE OILS

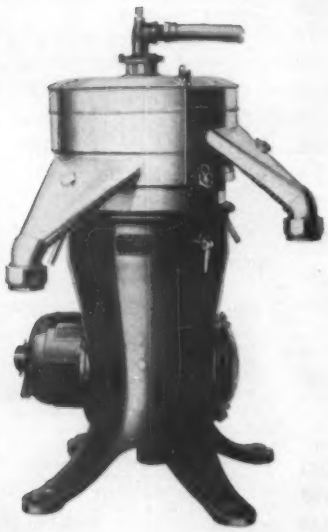
For Safer, More Economical Tests:

SHOCK ABSORBER

ENGINE BLOCK

ENGINE LUBRICATION

TRANSMISSION



De Laval Oil Purifiers keep test oils continuously clean . . . free of all contamination. By means of centrifugal force they promptly and continuously throw out of the oil all abrasive or solid matter that the test oil picks up in circulating through the engine, transmission or other automotive unit. These centrifugal machines insure that when oil is pumped back to the test floor, it is clean beyond the shadow of a doubt and safe to reuse.

There are many uses for De Laval Oil Purifiers in all types of metal working plants. Sometimes the basic problem is to keep oil clean, as in the cases cited above; sometimes the problem is the dehydration of an oil. In both cases a De Laval machine offers the certain, sure method of achieving the desired result.

THE DE LAVAL SEPARATOR COMPANY
Chicago POUGHKEEPSIE, N.Y. San Francisco

DE LAVAL PURIFIERS AND CLARIFIERS FOR FACTORY OILS

HEAVY LOAD/LIGHT WORK

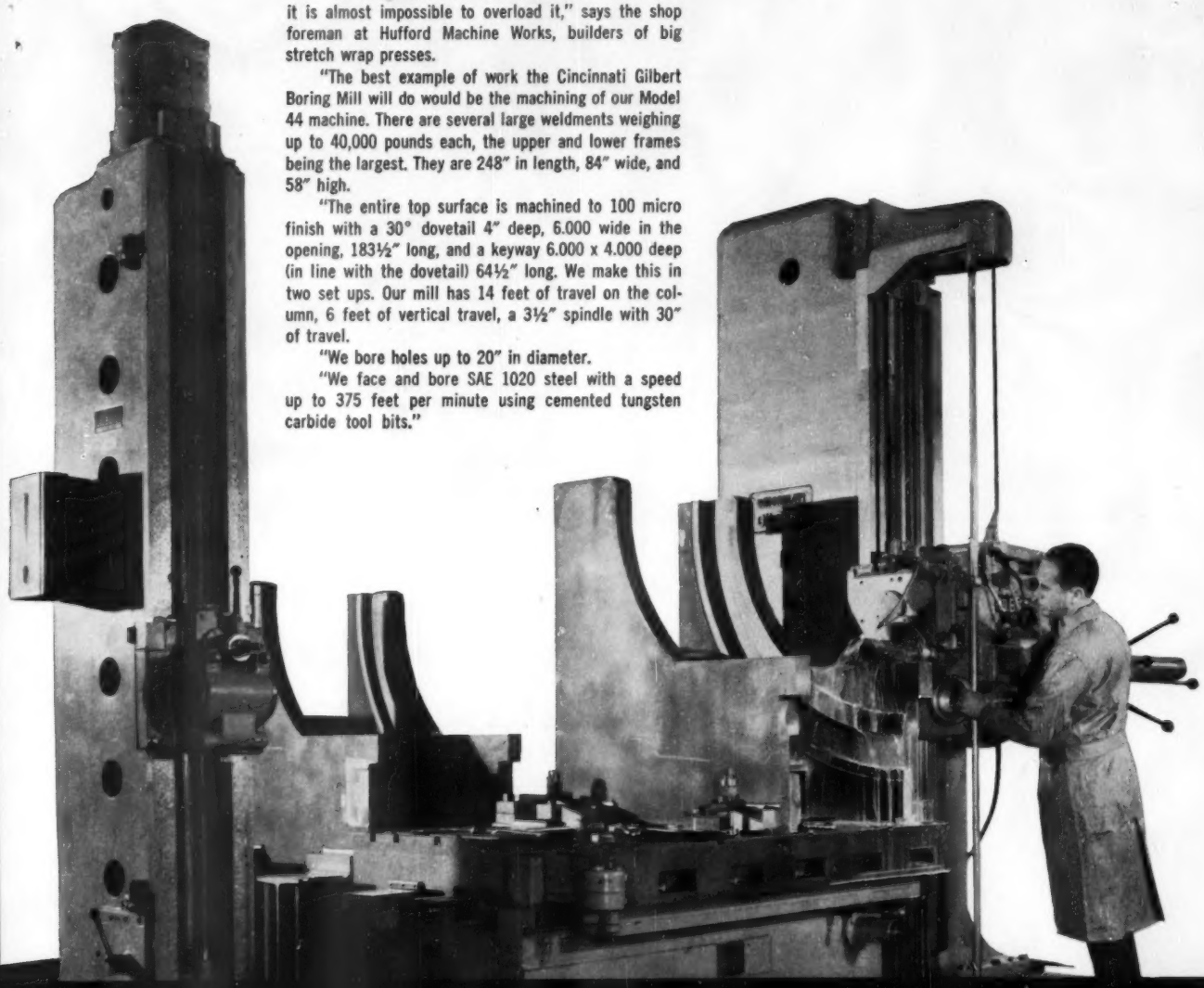
"The thing I like about the Cincinnati Gilbert is that it is almost impossible to overload it," says the shop foreman at Hufford Machine Works, builders of big stretch wrap presses.

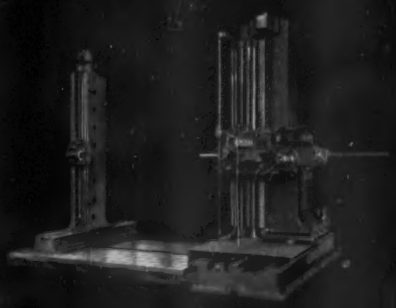
"The best example of work the Cincinnati Gilbert Boring Mill will do would be the machining of our Model 44 machine. There are several large weldments weighing up to 40,000 pounds each, the upper and lower frames being the largest. They are 248" in length, 84" wide, and 58" high.

"The entire top surface is machined to 100 micro finish with a 30° dovetail 4" deep, 6.000 wide in the opening, 183½" long, and a keyway 6.000 x 4.000 deep (in line with the dovetail) 64½" long. We make this in two set ups. Our mill has 14 feet of travel on the column, 6 feet of vertical travel, a 3½" spindle with 30" of travel.

"We bore holes up to 20" in diameter.

"We face and bore SAE 1020 steel with a speed up to 375 feet per minute using cemented tungsten carbide tool bits."

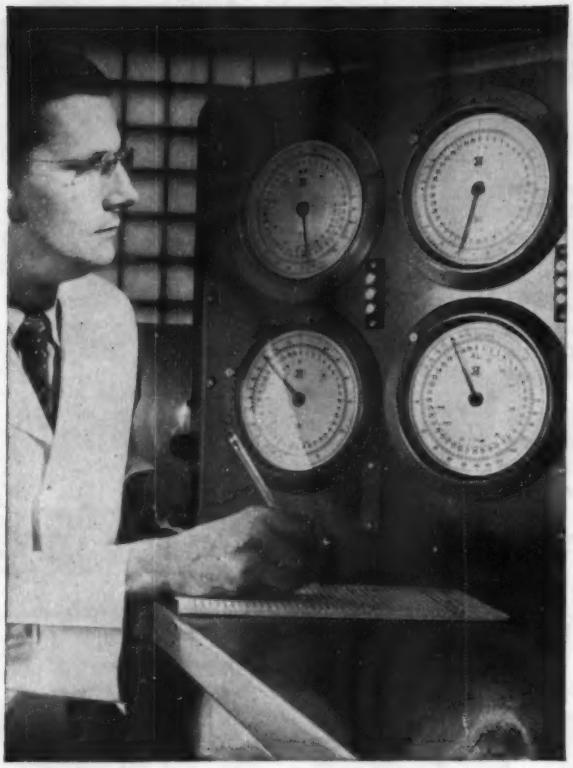


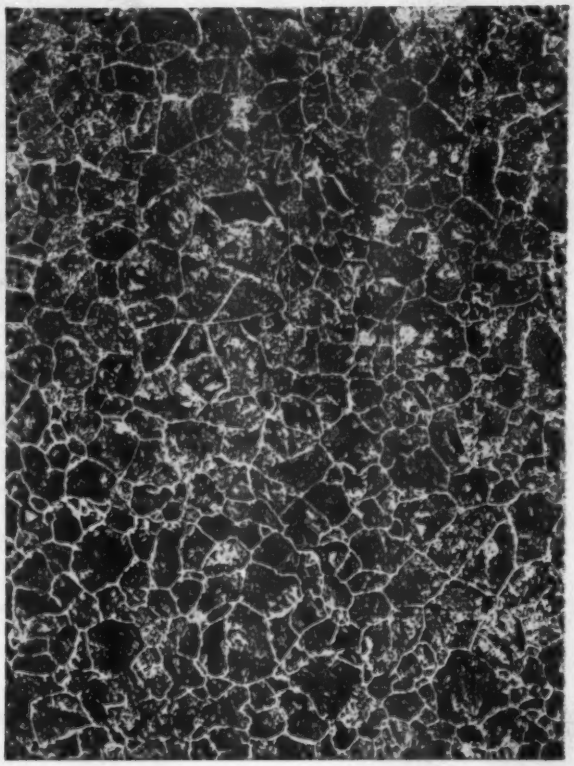


Centralized controls, frictionless response, maximum flow of power from motor to tool make light work of heavy loads on a Gilbert. Hufford uses a floor type machine with sliding table. Many other arrangements are available. Write for literature on these versatile machines.

GILBERT

THE CINCINNATI GILBERT MACHINE TOOL COMPANY • 3366 BEEKMAN STREET, CINCINNATI 23, OHIO





Meet two of the reasons why TIMKEN® forging steels give you uniform, high-quality forgings

THE man on the left helps assure you of uniform composition in every Timken® steel forging bar. With this spectrometer, he can tell the exact composition of a melt in just 40 seconds. Results are flashed back to the furnace so the melter can maintain constant control of the heat analysis up to the instant of pouring.

The photomicrograph at right shows the uniform grain size of the Timken forging steels. Uniform grain size after heat treatment is assured by spectrometric or microscopic examination of every heat. The result—you can be sure that forgings made from Timken forging steels have uniformly high ductility and resistance to impact.

But that's only part of the story. You can hold rejects to a minimum because we condition the steel to fit your particular forging requirements. And you save steel because the good dimensional tolerances of Timken forging steels produce uniform weight multiples with a minimum of steel lost in flashings. You even have fewer furnace adjustments because Timken forging steels respond uniformly to heat treatment.

For help in improving the quality of your forgings and cutting production costs, write: The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING